GOVERNMENTAL INDEMNITY

HEARINGS

BEFORE THE

JOINT COMMITTEE ON ATOMIC ENERGY

CONGRESS OF THE UNITED STATES

EIGHTY-FOURTH CONGRESS

SECOND SESSION

ON

GOVERNMENTAL INDEMNITY FOR PRIVATE LICENSEES AND AEC CONTRACTORS AGAINST REACTOR HAZARDS

MAY 15, 16, 17, 18, 21, AND JUNE 14, 1956

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GOVERNMENTAL INDEMNITY

TUESDAY, MAY 15, 1956

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee on Atomic Energy met at 10 a. m., pursuant to notice, in the House Caucus Room of the Capitol, Senator Clinton P. Anderson (chairman of the Joint Committee) presiding.

Present: Senators Anderson, Gore, and Jackson; and Representatives Price, Cole, Durham, and Van Zandt.

Also present: James T. Ramey, Wayne P. Brobeck, George E. Brown, and George Norris, Jr., of the committee staff.

Chairman ANDERSON. The hearing will be in order.

This morning the Joint Committee is beginning a series of hearings on proposed legislation for a Government indemnity or insurance program to supplement private insurance covering reactor hazards to the public. During the course of the hearings we will also discuss other possible road blocks, if any, to the civilian nuclear-power program.

The committee will hold a second set of public hearings beginning the middle of next week to consider proposals for acceleration of the civilian nuclear power program, including S. 2725, introduced by Senator Gore.

I do not think I need emphasize the importance of these hearings to the future development of our peacetime atomic energy program, both the domestic and international aspects. The results of these hearings may well have an important bearing upon the future direction and emphasis of our civilian reactor program and may in retrospect prove to be a significant benchmark in the evolution of this program.

As a means of providing an appropriate setting for these indemnity hearings I wrote an open letter to the atomic power industry, the insurance industry, and others interested in the program. This letter attempted to set forth the problems which the committee desired to consider, and stated some basic principles for possible legislation on the subject.

I think it might be helpful if this letter is inserted here as a means of considering the testimony which follows.

(The letter referred to follows:)

DEAR SIR: I am writing you along with others interested in the atomic power program, this open letter concerning proposed legislation for a governmental indemnity or insurance program to supplement private insurance covering reactor hazards to the public.

Let me say that the Joint Committee on Atomic Energy is scheduling hearings on this legislation during the week of May 14. It is hoped that all who have an interest in this problem will take this opportunity to inform the committee of their views.

As you know the Joint Committee has been studying this matter during the current session of Congress. As indicated below, a number of my colleagues and I believe we require additional information and assurances before the insurance problem can be solved legislatively.

I would like to outline a legislative proposal which several of my colleagues and I believe might provide the basis for consideration and further exploration during the hearings. In summary the proposal would include the following:

1. A governmental indemnity over and above a reasonable amount of public (third party) liability insurance provided by the private insurance industry at reasonable rates. A ceiling of $500 million would be placed on the governmental indemnity for any one disaster, with any damages over this sum to be handled by special legislation.

2. The liability of reactor operators and equipment manufacturers would be limited to their private insurance coverage, together with the sums made available by the Government for the third party claims under the indemnity arrangement.

3. The Government would make a minimum charge per year per reactor for its indemnity coverage with the proceeds to be devoted to the AEC's research and development program on atomic safety.

You will note that this proposal incorporates the indemnity features of Congressman Price's bill, H. R. 9701, but puts a ceiling on it. It also incorporates the limitation of liability features of Congressman Cole's bill, H. R. 9802, but provides recourse by the public under the indemnity up to $500 million. It also provides for a minimum payment for the excess coverage with the proceeds to be made available to encourage research and development in improved methods of reactor safety.

Finally, I would like to point out the additional information and assurances which might be required before legislation of this type can be enacted:

1. We need more specifics on the probabilities of reactor accidents, and extent of damage. Also needed is more information on AEC and industry reactor safety standards and practices.

2. We need information on the range of rates to be charged by the private insurance industry. We recognize that this is difficult for the newly organized syndicates. But Congress must know whether private reactor operators and equipment manufacturers are going to be able to afford private insurance—otherwise the Government indemnity might extend downward to an unreasonable extent. "We can't buy a pig in a poke."

3. We need information and assurance from the atomic power industry that if legislation along the above lines is enacted the program will be accelerated. Other possible roadblocks, if any, to this program should be disclosed and considered in relation to passage of this legislation.

As you know, the reason the Joint Committee on Atomic Energy is so interested in this legislation is because we believe it is in the national interest to encourage the rapid development of an atomic power industry in this country. We are convinced that ultimately (and probably sooner than we think) it will be a wise and economical investment from the standpoint of the utilization and conservation of our natural resources.

We sincerely hope that we can develop the factural and policy basis for recommendation of legislation on this problem during the forthcoming hearings.

Chairman ANDERSON. I would like also at this point to insert in the record a statement I made in the Senate regarding these hearings.

(The statement referred to follows:)

SPEECH BY SENATOR CLINTON P. ANDERSON, CHAIRMAN OF THE JOINT COMMITTEE ON ATOMIC ENERGY, DELIVERED IN THE SENATE, MAY 9, 1956

Mr. President, the Joint Committee on Atomic Energy is about to begin hearings on some fundamental problems which may well affect the future of the entire peacetime atomic energy program. These hearings were announced in my floor statement on April 26, 1956, and are scheduled to commence next Tuesday, May 15. Today I would like to say a few words more about their importance and about the objectives we hope to accomplish.

Two bills before the committee, H. R. 9701 and H. R. 9802, concern the question of public liability, or insurance, of companies engaged in the atomic energy program. As you know, the Atomic Energy Act of 1954 was intended to encourage

private industry to construct and operate nuclear plants for the generation of electrical power. The progress in this field to date has been slower than anticipated. During the past year the Committee has been informed by private utilities and equipment companies that certain problems must be solved before they can proceed in the atomic power field.

Chief among these problems is the question of liability to the public of manufacturers and operators of nuclear reactors in the very remote event of a reactor accident. The two bills before us are intended to provide the needed protection for the companies against unlimited liability. We have invited interested parties to testify, and we have requested industrial witnesses to disclose any other roadblocks which they believe stand in the way of progress of private industry in this very important field.

After considering the insurance problem, we will commence public hearings on Wednesday, May 23, on S. 2725, known as the Gore bill, and on other proposals for accelerating the civilian reactor program. The Gore bill authorizes and directs the Atomic Energy Commission to build six nuclear power reactors to assure advancement of the nuclear art, either in addition to, or in the absence of, private industrial participation.

As you know, Mr. President, there has been mounting concern both within the Joint Committee on Atomic Energy and elsewhere as to whether or not the United States can maintain its position of world leadership in the industrial and other peaceful applications of atomic energy, especially in view of significant progress reports made by the Soviet Union, and by our friends in Great Britain and France.

The Joint Committee has been continuously studying the world picture and our domestic status in the atomic energy field during the 84th Congress.

Thus, the committee members attended and observed the many interesting developments demonstrated at the International Conference on the Peaceful Uses of Atomic Energy at Geneva last summer. Also, following this, a panel of leading citizens, organized by the committee and known as the McKinney panel, studied and reported on our status and our future.

In addition, the committee conducted public hearings during the first 60 days of this session, in accordance with section 202 of the Atomic Energy Act, in order to study and hear testimony on the growth, development and future of the atomic energy industry. Following this, we conducted public hearings on the report of the McKinney panel.

In addition to these efforts, the committee conducted an informal advisory seminar to explore, with the help of many interested parties, the question of public liability as it affects civilian reactor progress. This seminar was most constructive in that it permitted the committee to receive a frank presentation of industry's views on this serious matter.

The time is now at hand, Mr. President, for our committee to place the whole situation in perspective, to examine the issues before us, and to provide congressional leadership in setting further objectives and policies to guide our civilian atomic energy program. Although consideration of the insurance problem has delayed congressional analysis of the whole civilian reactor problem, it is my hope that some action on both fronts can be taken in the present session of Congress. We cannot afford further delay. It is time that we attain a position where we may offer to the people of this country and to the free people of the world a product which is both advanced in concept and in being—not just paper plans and promises.

Our committee proposes to proceed in the following manner:

First, we feel that we must know more about the specifics of reactor hazards, safety practices, and insurance coverage. This is the purpose of the first set of public hearings on the question of public liability. We also want to identify other roadblocks, if any, to private development.

Next, in executive session, we will examine the international aspects in order to compare the progress of the United States with that of other countries in this field. Here and in the public hearings which follow we will attempt to assess what would be the effect in the position of the United States in the world if we ceased to be the leading Nation in the peaceful uses of atomic energy.

Finally, we will consider the Gore bill and other proposals for accelerating the program through Government construction of additional power reactors. Here we will want to determine the status of private atomic energy projects, and consider what additional efforts, if any, are required.

The McKinney panel, in its report, stated that if private industry does not or cannot assume the full risks and burdens of the nuclear power development, then the Government must do the job. Thus if Congress is expected to grant concessions to private industry, in addition to insurance or indemnity coverage in order to back up a lagging program, it may well conclude that more direct Government sponsorship and initiative is required to get the show on the road. This would not necessarily mean complete Government financing or construction of atomic powerplants. It could mean, for example, a cooperative arragement such as the Shippingport project, where the AEC, through its contractor, is constructing the reactor and the Duquesne Power Co. is responsible for constructing the generating facilities and operating the entire plant.

At the end of these hearings we should be able to report to the Congress and to tell you, Mr. President, what if anything needs to be done to assure necessary atomic progress in the United States in order to maintain world leadership and to develop and conserve our own natural resources. The Congress will then be in a position to take such steps as it considers necessary in order to achieve these objectives.

Chairman ANDERSON. Before we begin the testimony, I would like to say just a few words of reassurance to those who expressed concern over possible reactor accidents.

The fact that we are holding hearings at all is recognition of the fact that there is a risk, a remote one I might add, involved in the operation of the nuclear powerplants, and provisions must be made to protect the general public, plant operators and equipment, and manufacturers against such an eventuality.

Of course, there are risks involved in all our industrial activities, and our everyday occupations. I am sure many of you are aware of the hypothetical case of what might happen if an airliner crashed in the Yankee Stadium at the height of the World Series. Claims could run into the hundreds of millions of dollars. Naturally, the odds on such an accident that would occur are infinitesimal and we do not sit around worrying about it.

Yet, the remote possibility exists that such an accident could occur, given just the right combination of circumstances.

The same comment might be made about nuclear powerplant accidents. The chances of an accident are extremely remote, but we must take cognizance of this remote possibility in our plans.

I think that it is appropriate that any discussion of the insurance or indemnity problem begin with testimony from the Atomic Energy Commission, which, after all, has had by far the greatest experience in this field so far. I might say, that the Atomic Energy Commission's remarkable safety record is a tribute to the diligent efforts of the Commission to see that all possible safety precautions are taken, and it is in itself great assurance, that given proper precautions, we need have no fear of accidents.

Admiral Strauss, it is a pleasure to see you here this morning, and to know what you and other representatives of the Commission will have to say to us today will be of great interest to all of us.

Mr. Strauss, you may proceed whenever you are ready.

STATEMENTS OF LEWIS L. STRAUSS, CHAIRMAN; DR. WILLARD F. LIBBY, COMMISSIONER; HAROLD S. VANCE, COMMISSIONER; THOMAS E. MURRAY, COMMISSIONER; K. S. FIELDS, GENERAL MANAGER; HAROLD L. PRICE, DIRECTOR, DIVISION OF CIVILIAN APPLICATION; DR. C. A. McCULLOUGH, CHAIRMAN, ADVISORY COMMITTEE ON REACTOR SAFEGUARDS; WILLIAM MITCHELL, GENERAL COUNSEL; W. KENNETH DAVIS, DIRECTOR, DIVISION OF REACTOR DEVELOPMENT; DON S. BURROWS, CONTROLLER, DIVISION OF FINANCE, ALL OF THE ATOMIC ENERGY COMMISSION

Mr. STRAUSS. Mr. Chairman and members of the committee, the Atomic Energy Commission, in response to your request of April 26, has developed recommendations on the subject of legislation to supplement coverage through commercial liability insurance coverage of nuclear powerplants and other production and utilization facilities against atomic hazards.

The Commission agrees with Senator Anderson's statement that it is vitally important that ways be considered to remove obstacles to rapid progress in the nuclear power field. In view of the very thorough discussion of the development of civilian uses of atomic energy at recent hearings before this committee, we will not attempt to restate the importance to the national interest of encouraging widespread and rapid development of atomic power.

I hope that the views of the Commission presented here will aid in achieving this objective.

The insurance companies have said that they will be able to offer up to $65 million in public liability coverage per plant. We understand that this is about four times as much as any public liability policy which has ever been available for any single American industrial plant.

However, most of the representatives of the atomic energy industry concerned with manufacture or operation of large power reactors, who have expressed opinions on the problem of liability arising from their operation, have taken the position that the liability insurance expected to be available from the insurance industry will not provide adequate protection against the possibility of catastrophic accidents, remote though that contingency may be.

This is perhaps inevitable in a rapidly growing field in which there are hazards, the potential scope of which is greater than in other industries.

Although we believe that the probability of major accidents is very unlikely, and that the safety record of production reactors and experimental power reactors has been most reassuring, there is no experience in operation of full-scale power reactors of the types planned, and much development work remains to be done.

The lack of protection against possible liability in excess of the available insurance constitutes a major deterrent to the development of nuclear power by private industry. The Commission believes, therefore, that Government action to provide such protection is warranted until experience has been accumulated sufficient to incorporate this risk into the normal pattern of underwriting.

A number of atomic power projects have reached the point where very substantial commitments must be made soon if they are to proceed according to schedule. The Commission therefore urges that legislation be enacted at this session of Congress to provide this protection.

It is recognized that in taking such action the Government will be assuming responsibilities although, as will be pointed out later in this testimony, the Government has for the past 10 or more years taken similar responsibilities with respect to other parts of the atomic program.

The measures we recommend are justified, we believe, by the importance of rapid and widespread development of atomic power for civilian uses, by the unique hazards involved, by the still far from complete development of the technology, and by the lack of experience in its practical application for such purposes.

The views of the Commission on this subject will be presented in some detail by other representatives of the Commission. In response to your request of April 26, 1956, Mr. Price will first present the Commission's legislative proposal for Government assumption of a portion of the liability arising in the course of private operations.

Following Mr. Price's presentation, we would like to discuss the health and safety aspects of reactor design and operation which have led us to recommend this proposed legislation.

Dr. C. Rogers McCullough, Chairman of the Advisory Committee on Reactor Safeguards, will discuss reactor hazards and the measures for their control.

Commissioner Libby will describe the possible effects to persons and properties in the remote event that there should be a major release, a catastrophic release of radioactive materials.

Mr. Fields, the General Manager, will discuss the Commission's organization and procedures for exercising its responsibilities for assuring that atomic powerplants will be designed, built, and operated safely.

Mr. Mitchell, the General Counsel will discuss the legal basis for liability for damage caused by such events and will describe the indemnity agreements which the Commission has made with its own contractors.

If that arrangement of testimony is agreeable to you, we are prepared to proceed.

Chairman ANDERSON. Yes. One question came up from one of the members. Senator Hickenlooper wrote me a note and raised the question of what was happening at Shippingport. Here is a project that is going to get underway by the summer of 1957. What are the insurance, safety, and other problems that arose out of that, and how are they being handled? Would that be discussed during the course of these individual papers?

Mr. PRICE. It is covered in the testimony. We can answer it now if you prefer.

(The information referred to above appears on p. 94.)

Chairman ANDERSON. If it is covered in the testimony, that is satisfactory. I merely wanted to make sure that the information which Senator Hickenlooper suggested, and which I thought was pertinent, be developed at this hearing. Whatever happens at Shippingport is of interest to us, as an example.

Mr. STRAUSS. I referred to the fact that the Government had in the past assumed some responsibility. The Shippingport reactor as you know is a plant, part of which is owned by the Government and part by a private contractor. They will operate one part of that for the Government.

Mr. Price, will you continue the testimony at this point?

Representative COLE. Mr. Strauss, you statement with respect to the amount of available insurance from private sources being four times that that has ever been made available for any other type of human activity, arrests my attention. I was not aware that that $65 million figure was 4 times greater than any other comparable figure.

Mr. STRAUSS. I think it is a very significant and very encouraging thing, Mr. Cole.

Representative COLE. I was also wondering if in the Commission's investigation we anticipate that this $65 million is the ceiling that is going to run forever, or can we look to the possibility if not the probability in the very reasonably near future that $65 million ceiling can be increased to perhaps $150 million?

Mr. STRAUSS. I would not like to predict the time in which this change will occur, but I am confident, Mr. Cole, that with the passage of the years, the private companies engaged in underwriting such risks will increase the amount of risk that they are willing and able to take.

Representative COLE. That is a fairly reasonable assumption. If the companies, without knowing anything about the atomic energy business and having had so little experience on which to base a calculation of a risk—if they are willing to go $65 million in the dark it would seem that as they approach the light, that amount would be increased many fold.

Mr. STRAUSS. I would hope so.

Representative Cole. Is there any indication or any clear-cut expression along that line from the insurance people that you know of?

Mr. STRAUSS. I would like to ask the General Manager or Mr. Price if they have any answer to that question.

Mr. PRICE. Mr. Cole, I do not believe that there has been much indication as to what might happen insofar as representations from the insurance companies are concerned. It is my understanding that $65 million is a figure that relates to reserves or rather financial capacity that they think that they could now put on the line. I am sure that we all agree with the Chairman's statement that as the years go by this would be expected to go up.

I do not think the insurance companies have looked that far ahead, at least, in their discussions with us. I am sure that they are thinking of that.

Chairman ANDERSON. Is it not true that $50 million of this has come from the stock companies, and $15 million has come from the mutuals?

Mr. PRICE. I believe that is the rough breakdown.

Chairman ANDERSON. Is it not also true that most companies have, through their own boards of directors and sometimes by the insurance agencies of their own State's requirements as to how much risk they can assume without reinsurance?

Mr. PRICE. That is right.

Chairman ANDERSON. And is not this $50 million on the part of the stock companies tied into their own capacities plus their insurance facilities?

Mr. PRICE. I am sure that that is so.

Chairman ANDERSON. And the same thing for the mutuals?

Mr. PRICE. I am sure that is right. They can answer that better than we can.

Representative COLE. But the $65 million either of private or mutual companies represents the reserve financial capacity, just of those companies that are participating, is it not? Or does it represent the total reserve from all insurance whether private or mutual?

Mr. PRICE. The $65 million represents the capacity. I do not know how much it relates to reserves. It represents capacity that both the stock companies and the mutual companies have said they can make available as coverage for a single plant.

Representative COLE. But that reserve or capacity is limited just to those particular stock companies and those particular mutual companies who have expressed a readiness to go along, does it not?

Mr. PRICE. That is right.

Representative COLE. Or does it cover the entire insurance industry of all of the stock companies and all of the mutual companies?

Mr. PRICE. I do not know about all, but what they are doing is this: The stock companies, we understand, are organizing a syndicate and separately the mutual companies are organizing a syndicate to handle this business. They have canvassed presumably all of the companies that have sufficient resources to participate in this program, I believe. I doubt if it covers all of the companies. There must be a large number of very small companies that would have possibly, in terms of capacity, a token participation. However, even some of them may be included.

Representative COLE. Do you have information that would indicate the percentage of available stock insurance companies which is represented by the $50 million figure?

Mr. PRICE. No, sir; I do not have it, but I am sure that it could be made available.

Representative COLE. You could not guess at it?

Mr. PRICE. No, sir.

Representative COLE. You could not guess it?

Mr. PRICE. I do not believe that I could, sir.

Representative COLE. How about the same question with respect to mutual companies?

Mr. PRICE. I could not guess that either, sir, but I believe that the insurance representatives who appeared before, and who are here today would have that information.

Representative COLE. All right, thank you.

Chairman ANDERSON. I believe some of the insurance companies are going to testify and they can answer that question. If you check marine insurance, sometimes they form a little group, and take certain types of marine risk. Sometimes that does not cover all of them, but it covers a large part of it, and a tremendous percentage of the carrying capacity.

We will check and see that we have Mr. Chubb appearing on Thursday afternoon representing the American Insurance Association.

Representative COLE. I would like to be able to fix that figure in my mind. It appears to me that if this $50 million represents 25 percent of the available stock company capacity, we can anticipate much

sooner than perhaps the 100 percent of the stock insurance capacity will provide 4 times the $50 million, or $200 million.

Mr. PRICE. My impression is that they have substantially covered the industry, but I could not be accurate.

Chairman ANDERSON. Is Mr. Yount here? Is there anybody here that has an answer to Congressman Cole's question?

Mr. HAUGH. I believe, as I understand it, sir, the question has to do with——

Chairman ANDERSON. The stock companies have indicated after surveying the field that they thought that they might be able to write a $50 million policy covering one operation. The mutual companies rave decided they might in the beginning at least participate to the extent of about $15 million. Congressman Cole's question is this: Does that include all of the writers of insurance who might be interested in joining a pool, or is it a selected group of companies that have associated themselves together as companies did in marine insurance several times.

STATEMENT OF CHARLES J. HAUGH, VICE PRESIDENT OF THE TRAVELERS INSURANCE CO.

Mr. HAUGH. At the risk of boring you I would like to give you a lengthy statement in response to that. First, with respect to the stock companies syndicate with which I am most familiar: the stock company syndicate was organized by extending an invitation to every stock company licensed to write casualty insurance in the United States and rated in Best's Analysis.

Now, you may ask why we took that. That is a book which undertakes to rate all insurance companies of the United States. That meant that invitations were sent to approximately 650 companies in the country.

Chairman ANDERSON. Those are stock companies?

Mr. HAUGH. I am referring only to stock companies, sir. A great many of those are small, local companies writing very limited volumes of insurance, and frequently limiting the kinds of insurance they write. Many of those very small ones did not elect to participate in this, and that is perfectly understandable. It is not the kind of business they write, and the amount of insurance they could assume would be extremely limited.

The syndicate which the stock companies organized and completed last week has in itself membership approximately 110 companies, including groups of companies. It is either companies or groups of companies. With almost no exception, there may be one or two, included therein are the companies that write liability insurance generally in the United States, and there are also included some companies which write on a more local basis.

To be more specific, sir, I would say that that number of companies in that syndicate represents far and away the vast majority of the available liability insurance capacity of stock casualty companies. It is a much greater percentage of the capacity than it is in number of companies.

Representative COLE. Would it be 90 percent?

Mr. HAUGH. This is a guess I would say 90 percent. That is a guess estimate, if you will, but I think a reasonable one.

Representative COLE. It could be calculated with reasonable accuracy.

Mr. HAUGH. No, because you would have to define it. The difficulty is that there are companies which insofar as statutory provisions are concerned might be entitled to write an amount of insurance on any one risk which is greater than the amount they actually have ever been willing to accept.

May I explain, sir, in that respect, that the States have legislation, individual States have legislation, limiting the amount which any one company may be at risk on an individual risk, and that is limited generally to 10 percent of the combined capital and surplus of the company. Most companies retain actually, for their own account substantially less than that 10 percent.

Representative COLE. Thank you, Mr. Chairman. I think that gives me a close enough approximation. It would indicate that substantially all of the available insurance has been laid on the line for this purpose by the insurance industry.

Chairman ANDERSON. It might be well to put into the record at this point a paragraph from the press release of the Nuclear Energy Liability Insurance Association, issued on May 9, which listed the companies that are elected to the governing board, and it includes the Aetna, the Hartford, Insurance Company of North America, Maryland Casualty Co., and the Mercury and Travelers Group. The United States Fidelity & Guaranty and firms of that nature that are extremely well known in the business.

As Mr. Haugh has suggested, probably it covers a large share of the writing capacity of the stock companies.

The paragraph is as follows:

The following companies were elected as members of the governing committee: Aetna Casualty & Surety Co., Fidelity & Casualty Company of New York, Hartford Accident & Indemnity Co., Indemnity Insurance Company of North America, Maryland Casualty Co., Royal-Liverpool Insurance Group, St. Paul Mercury Indemnity Co., the Travelers Group, and United States Fidelity & Guaranty Co.

Very well, Mr. Price. I think that is a fine point, Mr. Cole and we should clear these things up as we go along and probably it is easier than referring to them earlier and it sets the basis at least to question some of the insurance companies when they come on later.

I hope when we have testimony from Mr. Yount, that he can speak with reference to the mutual companies as well.

They have a large carrying capacity in the casualty field.

Mr. PRICE. Mr. Chairman, we thought that it would be well if we would first give a general outline of our legislative proposal before going into the technical and other detailed facts that give rise to the problem we have.

The principal question we have considered important in attempting to develop a sound legislative proposal to provide protection to production and utilization facility licenses and their supplies against the risk of third party liability are as follows:

(*a*) What type of legislative authorization should be adopted?

(*b*) What amount of liability should the facility operators and their suppliers be required to assume before Government protection would be provided?

(*c*) Should a charge be made for this protection and if so, what should be the basis for the charge?

Finally, should there be a top limit on the amount of protection to be offered?

Now, the Commission's approach to all of these problems has been heavily influenced by several facts: First, we do not expect to have a catastrophic accident in this field but we cannot guarantee against it.

Second, we do not know what the probabilities of a major accident are, but as previously stated, we are sure that the risk is extremely remote.

Third, since we have had no experience with this kind of accident, we do not know the magnitude of the losses, should such accident occur.

The Commission recommends that legislation be enacted which would authorize the Commission to issue indemnity agrements directly to holders of construction permits and licenses, and to their suppliers or in the alternative to issue reinsurance agreements to the insurance companies, that the protection offered by indemnity agreements or reinsurance agreements apply only to losses in excess of amounts of liability insurance determined by the Commission to be available commercially; that the legislation not place a top limit on the amount of the indemnity or reinsurance, but rather leave the amount in each case to be determined by the amount that the licensee is willing to buy; and that the charge for this protection be based on a schedule of charges which will bear a nondiscriminatory relationship to the premiums charged by the insurance industry for primary nongovernmental insurance.

Chairman ANDERSON. I assume that you are going to indicate what that charge might be later on in your testimony.

Mr. PRICE. I do not know that I will be able to indicate amounts, but I will discuss the criteria that we would use in developing the schedule of charges. I think our difficulty here is that we do not yet have any indication as to the amount of premiums that the private insurance companies will have to charge for the primary nongovernmental insurance within this $65 million band.

We feel sure whatever we charge ought to bear some relationship to that, and we think we have to take into consideration the desirability of not making a charge that would discourage widespread participation in the industry.

So, we have not thought we could come to grips with the question of charge until we know what the private insurance is going to cost.

Chairman ANDERSON. Could you not just carry that one step further and say that the man who contemplates building a reactor cannot come to grips with his problem until he knows what his insurance is going to cost him?

Mr. PRICE. Yes, sir.

Chairman ANDERSON. Sometime, someone has to start.

Mr. PRICE. It could be that the insurance companies are ready to say what their charges would be. But the latest indication that we have had from them is that they have not yet developed their charges. Certainly, this is an uncertainty for the whole industry until the charges are determined.

Chairman ANDERSON. Would you think it would hold back reactor development, not knowing what they are going to have to pay for insurance?

Mr. PRICE. Sir, even if we fixed an amount for the excess coverage——

Chairman ANDERSON. I am talking about all insurance rates, the primary coverage which the insurance companies would carry and the excess rates which the Government might charge.

Mr. PRICE. I believe that the atomic-energy industry generally is assuming that the charges that the insurance companies will make will be reasonable. Certainly the insurance companies are offering this insurance to get business and they will approach it from that standpoint.

I doubt that in the next few months, which is our understanding of the period during which the syndicates think they will be able to come up with rates, any projects will be held back on account of the few months it will take the insurance companies to develop definite rate schedules.

Chairman ANDERSON. Then, the question of rate is not worrying them?

Mr. PRICE. I have no guaranty that these rates will be of an order of magnitude that will not be a deterrent to the purchasers of insurance. It seems to us that until the rates are known, we have to assume that they will be rates that people can pay.

Chairman ANDERSON. Are any rates quoted to Shippingport as yet?

Mr. PRICE. No, sir. The situation there is that that plant is owned by the Government, and the contract with the operators contains an indemnity agreement just like the contract at Hanford with the operator there, and the contract at Savannah River with the operator there.

So, the purchase of insurance in the context we are talking about will not be involved, as I understand it. The Government will contractually agree to hold the operator harmless, and, in fact, I believe that is in the contract.

Chairman ANDERSON. Will not Duquesne Power & Light have any operational responsibilities whatever?

Mr. PRICE. For the part of the plant that they will own, that is the generator facilities.

Chairman ANDERSON. Just the steam that they get?

Mr. PRICE. They will operate the reactor.

Chairman ANDERSON. If they operate it, they will have some responsibility, will they not?

Mr. PRICE. They will have the liability initially, but the Commission in its contract with Duquesne has agreed to hold the company harmless. In other words, that situation is taken care of by an indemnity agreement already in existence. Our problem here is that for privately owned reactors we do not have authority to make indemnity agreements. That is why we are asking for the authority.

Chairman ANDERSON. Senator Gore asked if Duquesne is not privately owned?

Mr. PRICE. Duquesne will own the generating facilities, and perhaps a portion of the reactor facilities.

Chairman ANDERSON. If it owns a portion, it has a liability, does it not?

Mr. PRICE. To that extent. I would have to ask Mr. Mitchell to explain the indemnity agreement. But the fact is, that the reactor facilities, except for some identifiable associated pieces, I believe, are

Government owned, and the company will be held harmless in connection with the operation of the Government-owned facility.

Chairman ANDERSON. Well now, Duquesne received a quick writeoff of its plant because of its ownership of it.

Mr. PRICE. That would be the part that they own, the generating facility. Of course, they have full liability with respect to the part that they own. We are not holding them harmless on that.

Chairman ANDERSON. I thought they received the quick writeoff because this plant was an experimental plant.

Mr. PRICE. Sir, they may have for the part that they own. They could not have written off the part that the Government owns.

Chairman ANDERSON. The generating facilities were not experimental.

Mr. PRICE. I do not know. It is hooked up to an atomic-energy plant and I am not familiar, sir, with the facts or the basis on which they may have received a tax writeoff or a fast tax writeoff.

Chairman ANDERSON. Will you proceed?

Representative COLE. I would like to ask a question there. Mr. Price, could you interpret this expression, when you refer to the anticipated schedule of charges:

> Which will bear a nondiscriminatory relationship to premiums charged by insurance companies for primary nongovernmental insurance.

What do you mean by that? Do you have a schedule of charges which will not be discriminatory or bear a nondiscriminatory relationship to commercial rates?

Mr. PRICE. What we have in mind, Mr. Cole, is that we would establish a reasonable charge for increments of additional coverage above the amounts that the private insurance companies offer.

For example, if the private insurance companies write $65 million, we might have a charge for the first increment of the Government indemnity, perhaps $50 million, and another charge for the next $100 million and another charge for the next $200 million and so on.

What we are saying in this proposed bill is that in the establishment of these charges we would have to take into consideration two things. First—the premiums charged by the private companies for the private insurance, and second, we would have to consider the objective of establishing rates which will not tend to discourage widespread participation in the use of atomic energy for peaceful purposes.

That is the criteria that we are recommending that we be guided by in determining the charge.

Representative COLE. That is a criteria which the private insurance will have to apply also, is it not? That is, that the rates will not be so high that the applicant cannot afford to buy the policy.

Mr. PRICE. That is right, although in their case, as best they can, I am sure that they will be taking into account for each particular reactor the factors of location and their judgment of relative safety of one reactor as against another. From our standpoint, we do not intend to license any reactor unless it meets what we regard as the minimum requirements for safety.

However, even so, the insurance companies will, I suspect, make judgments as to the relative risks which may mean that the premium or the rate which they would charge for one reactor in a particular

location might be different than the rate that they might charge for a different reactor in a different location.

Representative COLE. I take it then, what you have in mind is that the Government's rates will be based largely or at least have a direct relationship to the rates which are charged by private insurance companies?

Mr. PRICE. Let me give an example of that, Mr. Cole.

Representative COLE. Is that right, though?

Mr. PRICE. Yes, that is right. Suppose the last increment of the private insurance was 1 percent or one-half of a percent or some figure. We would then start the first increment perhaps of the Government insurance at some percent, and it might be a tenth or a twentieth of that and so on, in a descending scale.

We frankly will have to look at this from time to time as we get some experience. Certainly in the beginning we would have to give heavy weight to the criteria of being sure that the total of our charge does not defeat the program. We do not intend to develop any reserves or to collect premiums that will pay off in case of a catastrophic loss. That kind of a charge would just be prohibitive.

Representative COLE. That is what the insurance companies are going to base their charge on, to build up a reserve; are they not?

Mr. PRICE. I think they will have the objective of building up reserves, but we do not see how we can make a charge for the protection in the area that is referred to as catastrophic losses with a few plants, that will build up a fund in any foreseeable time that would pay off in case of a catastrophe.

We do not expect to have one of these catastrophes, so that we have to look at it from that standpoint.

Representative COLE. To the extent you do not anticipate building up your reserve, it is rather meaningless to say that you are going to tie your rates to the private rates, because the private rates are based on anticipated building up of a reserve.

Mr. PRICE. We do not necessarily use the same curve that they use. We might start at one-twentieth or one-hundredth or one-tenth of the premium that they fix.

Representative COLE. Then the relationship with the private rates will be rather remote?

Mr. PRICE. We had thought of it in terms of stating ours in terms of percentages of the private rates.

Representative COLE. I think that generally covers what I had in mind. Thank you.

Mr. PRICE. Shall I go ahead, Mr. Chairman?

Chairman ANDERSON. Yes.

Mr. PRICE. On the question of the type of legislation, we feel that the direct Government indemnity or the alternative of Government reinsurance will satisfy the need for protection of manufacturers and facility operators against the remote risk of catastrophic losses. We have recommended that the legislation authorize either alternative because we are not sure that the insurance industry is prepared to participate in a reinsurance program.

As previously stated, the insurance industry has said that it will have sufficient resources to offer upward of $65 million worth of liability insurance per plant.

The insurance industry feels that the risk of losses in excess of this amount should not be regarded as an insurance problem, and that any Government participation should be by way of indemnity rather than insurance or reinsurance. However, as previously stated, either the direct indemnity approach or the reinsurance approach would be satisfactory to the Commission.

Representative COLE. Could you take just a moment to educate me in the fine distinction between insurance, reinsurance, and indemnity? I understand the insurance industry does not look kindly on the idea of Goverment reinsurance or Government indemnity.

Mr. PRICE. On reinsurance, that is right. I do not believe they have voiced any objection to the Government establishing a program of indemnifying the atomic-energy industry for losses in these higher areas. I am sure that they would object to the Government having an indemnity or insurance program that competed with them.

What we mean by the indemnity arrangement would be a direct indemnity agreement between the Government and the reactor operators for example, running for the benefit of his suppliers, covering losses in excess of that.

Chairman ANDERSON. For the benefit of the suppliers? What is the matter with the public?

Mr. PRICE. Well, this is indemnification of the operator and manufacturer against his liability to the public. The public would have the same standing in court, and the same standing to claim for losses that they do in any other industry. What this would do would be to protect the assets of the operating companies and provide a fund for paying the public in case of loss.

Senator GORE. You mean to reimburse for the payment to the public?

Mr. PRICE. That is right, sir.

Senator GORE. You propose that the Commission pick up the losses?

Mr. PRICE. That is right, sir.

Senator GORE. Thank you.

Representative COLE. The losses in excess of the amounts of the insurance companies?

Mr. PRICE. That they can write, yes.

The reinsurance approach would involve the insurance industry first writing this excess coverage, and then coming to the Government to reinsure the insurance companies. That is the alternative that we have stated in the proposed bill. As I said up to now, the insurance industry has said that they would not participate in that kind of a program. At least, the ones we have talked to have said that.

I think they can speak for themselves better than I can.

Representative COLE. Where is there any advantage in the Government being a reinsurer?

Mr. PRICE. The advantage would be to the extent that the insurance companies decided to go above this $65 million, it would lay a basis for eventually turning all of this over to the private insurance industry if they wanted to take it.

Under either basis, they can do that.

Representative COLE. Does reinsurance for excess liability indicate that that excess would be shared in some ratio between private insurance and the Government?

Mr. PRICE. The way the proposed bill is drafted, sir, it could be 100 percent reinsurance, or some percentage.

Representative COLE. Does that mean the Government would have the entire liability?

Mr. PRICE. For the amounts in excess of the original $65 million?

Representative COLE. That is what we are talking about, yes.

Mr. PRICE. Yes, sir.

Representative COLE. That being so, why bring the insurance companies in to it at all? If by way of reinsurance the liability of the Government is going to be 100 percent on the excess damages, why not take the indemnity route because the liability is going to be exactly the same, is it not?

Presumably the insurance companies are going to have some fee or percentage for whatever they do in connection with reinsurance, which apparently does not amount to very much except printing up a lot of forms and signing some papers which do not mean anything.

So far as eventual Federal liability is concerned, that would be true; would it not?

Mr. PRICE. That is right, but it puts it in the channels of the insurance industry and makes maximum use of existing facilities.

Representative COLE. That may be an advantage in doing that; is that right?

Mr. PRICE. As I have stated, on the basis of the information that we have to date, we expect that the alternative that will be used will be the direct indemnity, at least in the beginning.

Chairman ANDERSON. Well now, actually, is it not that reinsurance is route that most insurance companies travel in their conduct of their own business?

Mr. PRICE. That is right.

Chairman ANDERSON. And do they not do it primarily so that the insurance company assumes the responsibility for conducting the defense, and handling the transaction because it has to exhaust its $65 million first before the Government comes in. Generally, it wants to assume the responsibility for that defense if it is going to lose its money. I think most insurance companies carry reinsurance, do they not, and they do not have some indemnity agreement that takes care of that. but it is 100 percent reinsurance?

Mr. PRICE. Perhaps it is correct that most Government insurance programs like the proposed flood insurance and other insurance programs are on the basis of reinsurance of private companies. At least that is true in many of them.

Chairman ANDERSON. I would question that, but go ahead.

Mr. PRICE. Either direct Government insurance or reinsurance.

Representative COLE. I understand from your statement that the insurance industry does not look kindly on the idea of reinsurance for this excess liability.

Mr. PRICE. That is right.

Representative COLE. They do not want to have anything to do with it?

Mr. PRICE. From what they have told us, they would not want to participate in that kind of program. I think they felt when they came up with $65 million, they have really taken care of the insurance problem, and that this special problem of the catastrophe for this hazardous industry is something over and above insurance, and if

the Government is to take a part in it the indemnity approach would be better from their standpoint.

That is the impression we have received from them. Of course, you will have them testify, and they can state it better, I am sure, than we can. I think we would certainly agree that when they say they have done a fine thing to come up with $65 million, maybe they have solved what they regard as the insurance problem.

Representative COLE. They have gone just about as far as they can go.

Mr. PRICE. That is right.

Representative COLE. You cannot condemn them for not going further.

Mr. PRICE. We praised them, sir.

Representative COLE. I think they deserve great credit for that.

Mr. PRICE. That is right.

Chairman ANDERSON. Did you say they were working on rates and they hoped to have them in a few months?

Mr. PRICE. Yes, sir. You will recall that some months or so ago, they spoke on this subject, and they thought or I believe some of them gave a rough estimate that perhaps early in the fall they might be able to say something about rates.

Maybe they can come up with them sooner than that, but they have given us no indication that they are ready yet to state a rate. I think that they just organized some of the syndicates last week, I believe that was testified to this morning.

Chairman ANDERSON. Would the Government be ready to come up with its rates at the same time?

Mr. PRICE. I would think that shortly thereafter we would be able to come up with the rates.

Chairman ANDERSON. You would not feel that they might be developed jointly?

Mr. PRICE. I am sure that we will be wanting to work closely with the insurance companies, because we will rely heavily on their judgment and their facilities in administering this program. But whether the rates ought to be jontly developed, I just do not know. Maybe they should.

Representative COLE. Do you anticipate that the insurance rates are going to be static and exact for all applicants?

Mr. PRICE. I cannot answer that question except in this way, Mr. Cole: I think the insurance people have indicated that in the beginning of this program their rates will generally have to be tailored for the particular facility, that is right. Maybe they can cover this subject better.

Representative COLE. The nearest I can see that they would come would be outside limits of not less than a certain dollar value or percentage, and not more than some other amount. There are so many variable factors involved in determining a proper rate, I do not see how it is possible for the industry to fix a precise rate. I should think it would be rather difficult for the Commission to fix its rates.

It will be guided by the same consideration. Do you later on consider the factors which will enter into the Commission's determination of the rate?

Mr. PRICE. Yes, sir; I think that I have covered generally what we are prepared to say about it.

Representative COLE. You have covered it?

Mr. PRICE. What I intended to say is that we are in no position now to state rates in terms of dollars per million of coverage. What we are saying is that we want to be sure that we collect a reasonable charge, but after saying that we feel that the total of the charge we will make has to be such that it will not discourage entrance into this field in the sense of being prohibitive.

Having done that, we would try to relate our rates to some percentage of the private rates that are charged.

Representative COLE. I think we recognize the impossibility of fixing precise rates now. But it seems to me that you should be in a position to outline the factors which the Commisison will apply in determining the rate. Is the Commission undecided whether the geographic location of this particular reactor is going to be a matter or an element in fixing a rate for that reactor?

Mr. PRICE. Sir, I do not think that we propose to do it on that kind of a basis for this reason: In the first place, to the extent that those factors are important, they are inevitably going to be considered in the private rates that are charged. If we fix our rates at some percentage of the private rate that is charged, those factors will indirectly be taken into account.

Since we frankly do not intend that these charges will bear any relationship to building up a reserve that would be adequate to pay off in the case of one of these large losses, we think that there really is no good purpose to be served in spending a lot of time trying to be precise about matters like location and containment. That is, insofar as it affects rates. All of those matters get taken into account very carefully in the process of issuing construction permits and licenses for these facilities.

We are talking about a charge that will pay administrative expenses and beyond that will be reasonable, but really in some sense we are talking about token charges. We are not talking about building up insurance reserves.

Representative COLE. I am a little disturbed to hear you say—and I want to make sure I do not misunderstand you—but to hear you say that these factors, such as type of reactor and location, and so on, are not an element in determining the rate. You did not qualify the kind of rates that you are talking about.

You mean in your opinion and in the opinion of the Commission those considerations should not be factors in determining the rates as fixed by private industries?

Mr. PRICE. No, sir. I said I was sure that those factors would be taken into account by the insurance industry in fixing the private rates in the same way that all of those factors will be taken into account by the Commission in determining whether to issue a license for the facility.

Representative COLE. And the Commisison is going to take those same things into consideration, but the measuring stick that they are going to use in applying that consideration is the curve which will be adopted by the private industry?

Mr. PRICE. Yes, sir.

Representative COLE. And at a lower scale?

Mr. PRICE. Looking at the other side of the coin, and looking at the question of whether our rates might be prohibitive, we might bend that curve and we might start at some percent.

Representative COLE. That is what I say, but on a lower scale.

Mr. PRICE. Yes, sir.

Representative COLE. But the curve will be the same. I should think that it would have to be the same.

Mr. PRICE. I think that that is right.

Representative COLE. I do not want to tell you what you should do. I am trying to find out what you have decided.

Mr. PRICE. It would be on a lower scale, but you see they will be stopping at $65 million and we will probably be dealing in larger increments than they will, so surely it will not be a straight line. It will be a curve.

Chairman ANDERSON. May I come back to this question as to when you are going to start thinking about it. I realize that you have to say that you cannot do it now. Let me put it to you this way: We have been talking about a total coverage of some millions of dollars, perhaps, that might be necessary. The insurance companies have said that they might go to $65 million.

Now, going up to the millions and just leaving it in millions for awhile, suppose you tried to write an excess policy for $500 million above that $65 million. Somewhere you have to decide if there is going to be a rate for that.

Now, I have to buy some reinsurance for a little company that I happen to have something to do with and I think my minimum is perhaps 2.5 percent and my maximum is 5.5 percent, depending upon experience. If I try to apply a 2.5-percent rate to $500 million of excess coverage, I get up to $12 million a year pretty quickly, and I cannot possibly imagine that.

So we have to say that that sort of a rate is impossible. We try to start downward if you figured what sort of a rate might be possible. Is that in your considerations at all?

What I am trying to say, Mr. Price, is this: If we spend a long time in consideration of a Government indemnity or reinsurance program above the $65 million the insurance companies might be able to carry, and when we get all through we have to establish a rate that makes it impossible for anybody to buy it, we have not really accomplished much.

Mr. PRICE. That is why we have written into this proposed bill that we will not make it so high; that it is impossible. We are talking in terms of that.

Chairman ANDERSON. We are trying to get you to translate that into those terms. Do you mean a fourth of 1 percent, or 2 percent, or what?

Mr. PRICE. I think for the excess, we are talking about a figure like a 10th of a percent and a 20th of a percent. We are talking about charges in the range of units of 10,000 and not units of 100 thousands of dollars of charges, because you would get to several hundred thousand dollars of insurance which represents 1 mill per kilowatt for some of these fairly large reactors.

Chairman ANDERSON. One of the operators, and perhaps I had better say a process manufacturer has discussed the possibility of

$5 million. You are talking about one-tenth of 1 percent, and that is $500,000 a year. Would you think that figure was possible for a $45 million plant?

Mr. PRICE. I was talking about the earlier increments. At some point we would have to level off; $5 million would be prohibitive.

Senator GORE. Could I ask one question right there?

Chairman ANDERSON. I am only trying to find out what you mean by saying that it has to be of such a nature that it would not interfere with what you now have.

Senator GORE. May I ask one question, Mr. Chairman? If the purpose of premium is not to establish a reserve, and it is not to protect the Government wholly, or even attempt to do so, why do you need a premium beyond a sufficient amount to take care of administrative costs?

Mr. PRICE. Just this, Senator: We thought in addition to administrative costs in the Commission that while we cannot give any validity to any estimates of probabilities in this field, nevertheless the protection that the company will get against the risk has a value. I hate to use a word like "arbitrary," but certainly when we disavow an intention to build up a reserve, it is true that we are talking about a charge that is arbitrary in that sense.

We are talking about token charges in relation to Senator Anderson's figures of 5 to 12 million dollars premiums. We are not talking about anything like that.

Senator GORE. I listened very carefully to your replies, both to the chairman and to Congressman Cole. I do not find myself in disagreement thus far with the objective of the proposal here. But I must say that your responses to both the chairman and Mr. Cole have left me in doubt as to the purpose of a premium and the necessity of a premium unless it be to defray the administrative costs.

The reinsurance and the indemnification operates as an additional aid on the part of the Government. I would not like to call it a subsidy, because we do not know that it would actually operate as a subsidy.

Mr. PRICE. That is right.

Senator GORE. I am not attempting to take a position of disagreement with it, but I do wonder why you must charge a premium beyond that which is reasonably calculated to defray administrative costs of the program, if the purpose is not to build up a reserve and if the purpose is not to charge a rate commensurate with the liability.

Mr. PRICE. Sir, the purpose is not to build up a reserve. When you say "commensurate with the liability," we consider the probabilities here extremely remote, and so maybe when we are talking about small charges it does bear some relationship to being commensurate with the risk.

I think what we are saying is that apart from the matter of recovering an administrative expense, regardless of the remoteness of this risk, the protection that the companies will be getting is worth a reasonable charge. The difficulty that I am having is giving concreteness to the amount of that charge, and I do not know how to give concreteness to it without better information than I have as to what the burden of the charge for the private insurance will be.

Senator GORE. Then do you have in mind the fixing of a rate commensurate with the benefits to the companies involved?

Mr. PRICE. Well, if you leave off the word "commensura'e," we do not know how to measure the value of it because we do not know the probabilities. Frankly, we are saying that we will make a charge that will not de er people from going into the business, and whether that turns out to be commensurate with the risk we will never know until we have had an accident, and then we will know for sure.

Senator GORE. I do not think that I quite agree with you, that there is no way of determining the value of it until you have an accident.

Mr. PRICE. We have no experience, Senator.

Senator GORE. I agree there, also, but I do not think that we must have an atomic explosion in order to fix some value or reinsurance.

Chairman ANDERSON. Now, Mr. Price, we have a war-damage insurance policy that was issued some years ago. There did not seem to be any possibility that war was going to get to this country, but they charged a rate for it, and they found some basis for doing it.

Now, to be sure, the brokers and the companies made whatever money was made out of it, and the Government held whatever sack was held, but they found a rate.

When they tried to insure a very sturdily built building against earthquakes we saw that the possibility of damage, unless it is in a particular section of the country, is extremely remote, but the insurance companies find some way of developing rates. When you bond a contractor who has as many assets as the insurance company who bonds him, there is not much hazard to it, but the insurance companies have found a way of charging him a rate.

I am just trying 'o find out if you have any idea of making use of this vast experience of the insurance companies to help you decide what might be a rate.

Mr. PRICE. We will be working with the insurance companies.

Chairman ANDERSON. That is the question I asked a while ago, and there was not any answer that you were going to work with them on the development of a rate.

I am glad to find that you are, because I think that there could be very valuable information to you there in helping you to establish some reasonable basis for the establishment of a rate. Five million dollars would seem to be too high, and $12 million would be too high, and half a million dollars may be too high. But somewhere there must be a figure that seems reasonable, and that is where it must be.

Mr. PRICE. It is somewhere in that lower range. I should have emphasized that this bill that we proposed requires the Commission to make maximum use of the facilities of insurance companies, brokers and agents, to the extent that we can use them in administering this program.

Chairman ANDERSON. If you attach your program on top of theirs, you would not have the responsibility of going out and establishing primary rates. It might be much easier to do it that way.

Mr. PRICE. That is what we had in mind.

Representative PRICE. I was wondering, Mr. Price, if in your thinking about the matter of rates which is posing a very difficult problem, whether you have given any attention to probably basing it on the nuclear fission and power output of the facility?

Mr. PRICE. Yes, sir. We have thought about basing it on power output and we thought of all of those matters in terms of the takeoff point.

Representative PRICE. That is one way of approaching it.

Mr. PRICE. For the same reason we rejected such criteria in fixing the point at which the Government indemnity would begin. We would probably find it not suitable for fixing the rate, because we found by using those criteria like power output and fission products in the pile, and amount of fissionable material and using any of those as a guide——

Representative PRICE. I am not suggesting that, Mr. Price, but I have heard it thrown out someplace before and I just wondered if the Commission had thought of it on that basis, and what their expression might be on it.

Mr. PRICE. We thought of all of those factors in connection with fixing the point of liability and every time we plotted a formula with them, we came out with some fairly ridiculous results in terms of coverage. I am sure we would end up the same way on the rates.

Representative COLE. Before leaving that point, Mr. Price, would not the question or the suggestion made by Mr. Price, my colleague on the committee, be one of the considerations in the minds of the private insurance companies when they fix their rates?

Mr. PRICE. I suppose so.

Representative COLE. So there will be an element of that consideration?

Mr. PRICE. They will be tailoring their rates, taking into effect every consideration. We say we do not intend to build up reserves and they do intend to, we are sure. It seems to us that it is unimportant for us to try to refine our rates on the basis of such criteria. We can relate our rates, or work out our rates with the insurance companies on a basis perhaps where our rates are some percent of what the insurance companies charge. We will come as close as we can expect to come, to the matter of relating our charges to this risk.

Senator GORE. But there, Mr. Price, do you not think that the Commission must be guided by some policy? It seems to me that the program should be either fish or fowl. It is either a reinsurance or an indemnity program on the part of the Government for which charges are made commensurate with the liability assumed, or it is a Government insurance program that is given with only a minimum charge sufficient for administrative costs.

Now, it is either an aid to industry to facilitate their coming into this program, or it is a business proposition. Now, if it is going to be operated actuarially from a business standpoint, then by some standards the Commission must fix rates to the best of its ability commensurate with the liability.

Unless you do that, then let us just acknowledge that it is an additional subsidy on the part of the Government to facilitate the entrance of private industry into atomic power. So far as I am concerned, I want to lean over backward to facilitate or to encourage and to hasten development of atomic power by private industry.

However, there should be no camouflage. If this is to be a subsidy on the part of the Government, then let us acknowledge that it is such. If it is to be paid for by the industries involved, then let us acknowledge that.

Thus far, you have not given us any guides as to the purpose, or as to the policy of rate fixing.

Mr. PRICE. Senator, we do not think that we can characterize this as being a subsidy or not a subsidy for the reason that we do not know what the probabilities are, and we do not know the magnitude of loss if one comes.

Senator GORE. What you mean to say is, I take it, that you cannot specify any value and therefore unless there is a specification of value, you cannot say that it is a subsidy of a given amount. But let us take some other word. I said earlier that I do not like to use the word "subsidy" in connection with this. It is a governmental aid. It is an assumption of a risk on the part of the whole people for the benefit primarily of the company involved, but for the overall and laudable objective of benefiting the whole people through the development of atomic power.

Mr. PRICE. Yes, sir; we agree with all of that.

Senator GORE. If that be the case, and you say that you agree with that, then should not there be some method of fixing the value?

The Chairman of the committee has referred to the war risk insurance. I think that would be one index. The charges of the private concerns for the insurance up to the point of departure would be another index.

Now, I am not inclined to insist that you charge a rate commensurate with the liability. But it does seem to me it ought to be one or the other. If this is to be a "giveaway" of insurance liability, then we might as well acknowledge that that is it.

I am not prepared to say that I would not support that, feeling that it is so urgent to have this country develop atomic power, particularly when we have on the front page of the paper this morning a prediction on the part of the head of the atomic energy program in Great Britain that they will soon be outstripping the United States in this field.

Mr. STRAUSS. May I comment on that point? I happened to be present at that interview and the headline did not bear out the text. The British Atomic Energy Chairman stated that their needs for power were greater than ours, because they were not controlled by the same necessity to produce power at low cost as we were. He also stated very emphatically that they had no civilian power reactors under construction, and that they proposed to let contracts this fall, and that their first reactors for civilian power would come on stream in 1960 or 1961.

Since the first American civilian power project will come on stream next year, I think the headline was misleading.

Senator JACKSON. Admiral, we have publicly admitted, however, that in the field of thermonuclear energy the Soviets at least in one very vital area may be ahead of us in research at least 2 or 3 years.

Mr. STRAUSS. I know of no such admission by anyone qualified to comment on it and familiar with the facts.

Senator JACKSON. I am, of course, referring to Dr. Libby's statement.

Dr. LIBBY. I didn't make any such statement, Senator Jackson. The statement must have been misinterpreted, sir.

Senator JACKSON. You are familiar with the release of the testimony in the authorization bill?

Dr. LIBBY. This had to do with a different matter, Senator.

Senator JACKSON. I say in the field of thermonuclear energy.

Dr. LIBBY. I am sorry. I recall now. I was referring to a billion-volt accelerator machine, sir.

Senator JACKSON. I meant in high energy research or high energy physics.

Dr. LIBBY. I thought you meant thermonuclear.

Senator JACKSON. I say, did you say that?

Mr. STRAUSS. I think the Senator did use the expression thermonuclear.

Senator JACKSON. That is correct, but I thought there was some connection between thermonuclear and high energy research work. At least in this one area of accelerators have they outstripped us?

Dr. LIBBY. Yes; in the accelerator field there is no doubt that we have been outstripped in this particular area. This is an important area, but they have a machine operating or near operation which is of higher energy than any machine we have or will have until about 2 years from now, when there will be one at Brookhaven of higher energy.

Senator JACKSON. Isn't it also, of course, true that the Soviet Union and England will have greater installed capacity of atomic generating facilities?

Mr. STRAUSS. May I?

Senator JACKSON. Yes; and, therefore, will give an opportunity for these countries to learn by experience that is inevitable in that kind of operation?

Mr. STRAUSS. Senator, I don't believe that that is so. Both countries have announced certain goals. We, of course, have no way of knowing what goes on behind the Iron Curtain other than the fact that they showed photographs and models of a 5,000-kilowatt reactor at Geneva, and various people have seen that reactor.

We were told that they had a 100,000-kilowatt reactor building, but more recently information is to the effect that that is still on the drawing board. We do not know positively whether it is or is not. As I said, with respect to our British friends, they have several reactors building, two of them at Calder Hall, duplicates of one another, as part of their weapons program. They are building to produce plutonium for their weapons program with power as a by-product.

Senator JACKSON. That is a dual-purpose reactor?

Mr. STRAUSS. Yes; except that it is built primarily for plutonium. We have considered dual-purpose reactors at various times in the Commission as power reactors which would produce plutonium as a byproduct.

The concept of the two reactors at Calder Hall is for plutonium as the main product, and power as the byproduct. They expect to have, according to the Chairman of the British Atomic Energy Authority, reactors designed primarily for power in 1960 or 1961.

Senator JACKSON. So it is your feeling, then, that the British will not have a greater installed power capacity than we will have within a given period of time?

Mr. STRAUSS. Yes, sir; and you have properly expressed it as a feeling. It is not based upon knowledge, because I do not know how rapidly we will be able to go ahead with our power program. Part of it is contingent on the issue that we are discussing this morning. Part of it is contingent on whether or not the British Government carries

out its program of building a considerable number of reactors between now and 1965.

Senator JACKSON. If they carry it out, where will we be, based on what they have programed and what we have programed?

Mr. STRAUSS. We have programed nothing, sir, at the moment beyond 1960 or 1961. We have proposed to build a reactor or see that a reactor is built of each new type; that is, laboratory tested, as rapidly as those reactors are ready for large-scale construction.

It would be impossible for me to say how soon there will be new types that are ready, although if you have been to Oak Ridge recently you have probably seen some in a very interesting stage of development.

Every reactor that is built in the United States that is uneconomic in competition with power produced in other manners and other means represents not only an increase in cost over conventional-type plants, but an annual cost representing the excess of the cost of that power over other costs.

I could not at this point risk a prediction as to what we will build in the United States between 1960 and 1965, but my feeling is that we will be building atomic powerplants all over the country then.

Senator GORE. Mr. Chairman, you emphasized a few moments ago that your British counterpart had said that the first British reactor for primarily civilian power would be in operation in 1960?

Mr. STRAUSS. Or 1961. He was not specific as to the date.

Senator GORE. You later said that the two reactors at Calder Hall were dual purpose. What is the size of the reactors now under construction at Calder Hall?

Mr. STRAUSS. They are expected to be somewhere betwen 60,000 and 75,000 electrical kilowatts.

Senator GORE. Each?

Mr. STRAUSS. Each.

Senator GORE. And when will they have power on the line?

Mr. STRAUSS. The first one is expected to come onstream in October of this year. I have seen no estimate for the second one.

Senator GORE. Then, though it is dual purpose, meaning that it can be used for the making of plutonium and for the generation of power, the British do have a large power reactor coming into production in 1956?

Mr. STRAUSS. Yes. It is about equivalent to the fact that we have had a power reactor at Arco, also a military reactor, as these reactors are, producing power since the summer of 1953.

We have had a reactor in the *Nautilus* producing power, a very considerable amount of it, since 1954. We have had a second submarine reactor producing power since 1954, I believe, or early 1955.

Senator GORE. What is the output of that reactor?

Mr. STRAUSS. The output of those reactors is, I am sorry, classified. I will be glad to give it to you. You are entitled to receive it. I don't think you would want it in an open hearing.

Senator GORE. Thank you. I already have sufficient information. I didn't know, however, that it was classified or I wouldn't have asked it.

Mr. STRAUSS. You see the reason, I am sure.

Senator GORE. Yes; I understand. The British program as planned is in the order of 2 million kilowatts or more by 1960; is it not?

Mr. STRAUSS. I don't know. I have seen numerous references to a figure of 1 million kilowatts.

I don't believe I have seen any estimate of 2 million, and I am sorry, I can't answer that.

Senator GORE. If the two plants for which construction permits have been granted should be completed as planned, what would be the power output of the two combined?

Mr. STRAUSS. You are speaking of the two Edison plants in New York and Chicago?

Senator GORE. Yes.

Mr. STRAUSS. What is the total of those?

Chairman ANDERSON. You have to take the New York plant and subtract the steam part of it from the nuclear part, and you come down to about 87,000.

Mr. PRICE. No, sir. The electrical kilowatts from the nuclear part of the New York plant is 140,000. They will get additional capacity from a superheater that runs it up to 240,000 or 250,000.

Representative GORE. But from nuclear, 100,000 or 140,000?

Mr. PRICE. Yes; and the Commonwealth Edison in Chicago is 180,000 electrical kilowatts.

Senator GORE. So that would be a total of 320,000 installed generating capacity if these plants are constructed?

Mr. PRICE. Yes.

Senator GORE. Construction permits have been issued. Do you have assurances from the companies in writing or do you have an obligation on the part of the companies that they will construct these plants?

Mr. STRAUSS. Senator, these companies are, as I understand it, asking for no Government assistance.

Senator GORE. That was not my question.

Mr. STRAUSS. I am trying to be responsive. Under what circumstances do you think we would be justified in requesting a guaranty from them that they would proceed with the construction of the plants?

Chairman ANDERSON. One of them has indicated repeatedly that they would like a solution of this insurance problem.

Mr. STRAUSS. I am sure that both of them must be very much concerned with the success of this.

Senator GORE. Mr. Chairman, you asked me a question that is perplexing coming from you. You asked me why the Atomic Energy Commission should have some assurance from these concerns that they expect to fulfill their part of a program when the Commission, which you head, has already granted a construction permit.

Mr. STRAUSS. That is right.

Senator GORE. And by that very act, it seems that you at least express tentative approval of the program.

Mr. STRAUSS. That is right.

Senator GORE. Do you mean that the Commission has no assurance at all that there will be construction under this program?

Mr. STRAUSS. Of course, I don't mean that, Senator. These are responsible companies with rights as citizens, their stockholders and officers, to request the Commission to take action which, under the statute, it is bound to take if its conditions are met, but there is nothing that requires the Commission to extract a guaranty from them that

with no assistance from the Government they will, without question, perform the construction of a plant.

Senator GORE. Then your answer is, I take it, if you will state it simply, that the Commission has no assurance?

Mr. STRAUSS. Yes; it has the assurance of the companies that this is their serious intent, but we have no document which, as a result of a valid consideration, we could hold them to, no contract, if that is what you mean, sir.

Senator GORE. Then when you issued the construction permit, you were traveling a one-way street.

Mr. STRAUSS. I don't know what that means, Senator, traveling a one-way street.

Senator GORE. What does the issuance of a construction permit mean?

Mr. STRAUSS. It means precisely that they are permitted to go ahead and construct a plant. If there is a legal amplification of that—pardon?

Representative COLE. I am just getting a little restless. I would like to get back to the purposes of the hearing, if we could.

Mr. STRAUSS. Would you describe what is implied in the issuance of a construction permit, Mr. Price?

Mr. PRICE. Yes, sir; the construction permit tells the company that they can go ahead and construct the plant. It gives them an assurance of availability of special nuclear material to fuel the plant. It tells them that on the basis of their submission to date that the Commission sees no reason why that plant can't be built and operated without undue risk to the public, but in the statute and the licensing procedure——

Senator GORE. Before you come to the "but," Mr. Price, did I correctly understand you that the construction permit gave assurances to the company that nuclear material would be available for the operation of the plant?

Mr. PRICE. The material has been so allocated for the operation of those plants, not set aside physically, but they have been told——

Senator GORE. Then the construction permit did operate as a binding commitment on the part of the Atomic Energy Commission?

Mr. PRICE. Sir, that is inherent in a license. The way the procedure is set up in the statute, these companies, when they spend their own money, are not required to sign a contract with the Commission to do anything.

They are required to furnish a license application saying that they intend to do it, but the way the law is written, there is nothing to keep a company, if it so desired, at some future time from withdrawing its application. This is not a contract procedure.

Senator GORE. Then, Mr. Chairman, that explains what I meant by saying the Commission was traveling a one-way street.

Mr. STRAUSS. You don't assume that the fissionable material would be made available to the company until it had a plant to put it in?

Senator GORE. There is a very clear implied obligation, if not actual obligation, according to Mr. Price's testimony just given, that a license will follow. You put yourself in a compromise position.

Chairman ANDERSON. Let me just say, you get your answer in, and then let's try to get on this insurance right after that, because we have

all next week on the question of where these plants are going to be put.

Mr. PRICE. This construction permit has a time limit during which they are to complete the plant. If they don't complete it within that time, then we take another look all over at availability of material, the whole problem.

In other words, we have said in this construction permit, as the law requires us to say, "You will get your license if you comply with the health and safety requirements. You will get your fissionable material. We are satisfied that your financial ability is all right," but it is conditioned on the plant being completed by a date fixed in the future.

Of course, they can come in and ask that the date be extended if they can't meet it. We would have to consider it on its merits. All I am trying to say is that this is not a contract arrangement. The statute doesn't contemplate this.

Senator GORE. I would just conclude by saying that Chairman Strauss's reply to his British counterpart is that our Commission has issued 2 construction permits which, if completed, would total 320,000 kilowatts, but with no assurance whatever that such programs will be completed.

Chairman ANDERSON. Senator Jackson, on the insurance.

Representative COLE. I would like to have the Chairman respond.

Mr. STRAUSS. I don't agree with the inference that the Senator puts on these licenses and these applications. I believe that they are made by American industry in good faith. I don't believe that the measure of our progress in the atomic-energy industry in comparison with any other country is a measure of the number of installed kilowatts.

It is not that kind of a race. As far as we are concerned in the United States, this is an attempt to advance our technology to the point that atomic power is competitive with power produced by other means at the earliest possible moment. The mere building of a large number of uneconomic plants in order to equal or surpass the number of installed kilowatts in another country's program, which isn't even underway, but is simply a program, does not appeal to me as being the test which the Congress has assigned to the Commission.

Senator GORE. Mr. Chairman, I did not question the good faith of American industry or these two companies. As far as I know, they are in good faith. What I am saying is that they are under no obligation whatever to complete the program on which you seem to be placing full reliance to maintain this country's lead in atomic power.

Mr. STRAUSS. That is not full reliance, Senator. We are going ahead with a number of other projects in some of which the companies are spending entirely their own money, in some of which there is a participation of Government and private money, and in others Government funds largely are in total represented in the investment. There are a number of such projects.

Senator GORE. We will talk about that some more next week.

Mr. STRAUSS. I am looking forward to it, Senator.

Senator JACKSON. Mr. Price, I think there is one area in which we can all agree, and that is when you talk about atomic power at least today, and for some time possibly to come, we are talking about high-cost power.

Mr. PRICE. That is my understanding, sir.

Senator JACKSON. I am speaking of the United States. It is high-cost power.

Mr. PRICE. Right.

Senator JACKSON. I want to see if I can get to the nub of this thing.

Have you determined how much you can add onto the costs in the way of insurance premiums and still not get this program completely out of gear?

Mr. PRICE. That is the question that I have been unable to answer all morning, Senator. It would have to be in the range of a fraction of a mill per kilowatt.

Senator JACKSON. I think there ought to be some decision. I am not concerned with a mass of details, but I would like to find out, if we can, Mr. Chairman, this morning.

It is a matter of policy and it is a premise that must be established.

Chairman ANDERSON. Going back to this question of those companies, Mr. Searing is the first witness tomorrow morning. We can ask him a good many questions. Subsequently the same day, the Association of Casualty and Surety Companies will be in. The Association of Factory Mutual Fire Insurance Companies will be in.

I think we ought to ask them how far along they are on this question of rates and what their general thinking is. I think you will tie your figures—I assume you would—into their figures.

Mr. PRICE. We have to, Senator.

Chairman ANDERSON. When a man rates excess insurance on an automobile, the basic rate has some relationship to the excess rates.

Mr. PRICE. That is right. We don't know what the relationship is in terms of total dollars.

Senator JACKSON. I want to ask some policy questions, because I think it is relevant on this insurance question. I assume you agree that we do not want to establish insurance rates that are going to make a highly uncompetitive situation more uncompetitive.

Mr. PRICE. We agree with that, sir.

Senator JACKSON. I would think that in view of the fact that, if we are at all honest with ourselves, that we are dealing first, at this stage at least, with a business effect and public interest, and secondly one that is going to have to be subsidized directly or indirectly, that we must be a bit realistic in trying to set insurance premiums.

I think we are going to injure the program if we get these insurance rates completely out of line. You can justify any kind of rate if you want to imagine what might happen.

I would like to see, Mr. Chairman, some guidelines from the Commission or some suggestions on it. Of course, I realize we can get some ideas from these other people coming in, but I think we are dealing with a subject that can only be dealt with in broad policy terms.

Our objective certainly ought to be to keep the price of this power down as low as possible so that we can encourage the greatest possible use, which in turn will give us the experience of many companies which will give us some hopeful solution in the future.

Mr. PRICE. As I said, we would regard that as our ceiling. We wouldn't propose to add a charge on top of the private insurance rate which, in the opinion of the Commission, would be an amount that would deter people from getting into this business.

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Senator JACKSON. If I can turn to the legal counsel for a question, I take it that you are going on the assumption that the doctrine of *MacPherson* v. *Buick Motor Co.* will apply, insofar as the manufacture of reactor parts.

MacPherson v. *Buick Motor Co.* is the case in which Justice Cardoza, as I recall, laid down the doctrine of rather strict liability, in which the Buick Motor Co. was held responsible for defective parts that resulted in a tort claim; is that right?

Mr. MITCHELL. That is right, sir.

Senator JACKSON. That is the substance of the case?

Mr. MITCHELL. Yes, sir.

Senator JACKSON. It has been a long time since I have been in law school and I have forgotten about it, but I think that is the case.

What I am trying to say is that people engaged in manufacture of parts for atomic reactors could conceivably be involved in a multimillion dollar lawsuit in the event there was a defect.

Mr. MITCHELL. That is right, sir.

Senator JACKSON. You propose, then, in yor insurance program to cover that situation, as well as the operator of the plant?

Mr. MITCHELL. We do, Senator, and it is our understanding that the private insurance companies will also grant the same type of coverage.

Senator JACKSON. My point is that with so many companies contributing to the construction of a reactor, you are going to have to cover a wide area of insurance here; is that right?

Mr. MITCHELL. Yes, sir; I think it is.

Chairman ANDERSON. This point is covered in the AEC testimony subsequently?

Mr. MITCHELL. Yes, sir.

Senator GORE. Mr. Chairman, I would like to ask one question with respect to this insurance program and its relationship to the construction permits.

Is it not true, Mr. Chairman, that Commonwealth Edison's construction permit is conditioned on a contract with General Electric to construct the reactor and that that contract, in turn, is dependent upon the solution of this insurance problem?

Mr. STRAUSS. I am not familiar with the details of the contract, Senator. In just a moment I will answer that question.

Mr. PRICE. Commonwealth Edison has made a contract with GE to build a plant and both of them have testified before this committee and they have told the Commission in their dealings with us that they would not be willing to carry this plant to completion without a satisfactory resolution of this liability problem.

That is right, Senator.

Senator GORE. Then what does your construction permit amount to except a publicity release?

Mr. PRICE. Sir, they are assuming that the insurance and indemnity problem is going to be resolved. They are going ahead with their plans and spending their money on that basis and they hope to start breaking ground, I believe, fairly soon.

I don't know just when, but they are going ahead. They haven't slowed down any. They are assuming that there will be a resolution of this problem.

Senator GORE. Also, you are under notice that unless Congress passes some legislation on this subject, the contract will not be consummated?

Mr. PRICE. You mean the contract with GE?

Senator GORE. Yes.

Mr. PRICE. Yes, sir; that is right; but in the meantime, they are both carrying out their side of their bargain so far as we know and are going ahead. They needed the construction permit for a lot of reasons, to assure themselves that it would be legal to go ahead and start construction, and to shore up their financing perhaps.

I don't know about that. We would have no basis for withholding a construction permit if they met the criteria of the law, simply because they have an unresolved problem in this liability field.

Senator GORE. Even though the Commission was on notice that unless there was new law on this problem, the program would not be completed?

Mr. PRICE. That is right, sir. This is a license.

Representative COLE. Mr. Chairman, I think the Joint Committee is on notice that nothing is going to move along with respect to the development of the power from atomic energy by Commonwealth Edison or any other company until this question is resolved.

It isn't something new. It has been before the committee for years. We knew that it was something to which the answer had to be found when we changed the law 2 years ago and the tragedy is that the solution wasn't found last year instead of 1956.

Now I am beginning to wonder whether we will find the answer in 1956 to this question of liability. Of course, it is a stumbling block. It is a stone wall. It stands right there square in front of us. Until a stile or hurdle over the wall is found, we are not going to get anything accomplished.

Mr. STRAUSS. I might say as an evidence of the belief of the General Electric Co. that this question is going to be resolved, they have gone ahead with the facility that they have projected for the bay area in California, and I believe broke ground for it last week or the week before.

That is the prototype which will make use of the fuel elements that will go into the Commonwealth Edison reactor.

Mr. PRICE. Likewise, the Babcock & Wilcox Co. has completed a plant in Lynchburg, Va., and will shortly be running critical assemblies for the Consolidated Edison plant. They are going ahead.

Senator GORE. This business of breaking ground may not necessarily mean very much. Dixon-Yates broke ground. [Laughter.]

Mr. STRAUSS. Senator, let me comment on that. The General Electric Co. and the Bechtel Corp. announced about 10 days or 2 weeks ago that they had placed some $5 million of orders for this plant. They listed the names of the companies and the amounts. I am satisfied that that statement was made in good faith and that the acts that they described that they had taken have been taken, and they are spending their own money.

Senator GORE. It would be interesting to see the reservations in those contracts, too.

Mr. STRAUSS. I haven't the contract, Senator.

Representative COLE. If I may, Mr. Chairman, get back to the questions raised by Senator Gore in connection with the determination of the amount of rate which the Government would charge for the

excess coverage, first I gathered from his questioning he raised the question that if you are going to charge a rate at all, why not charge one large enough to build up the reserve to cover the Government's liability, or if that isn't going to be your purpose, then why any rate at all, except one large enough just to cover the administrative purposes?

Those are very serious questions. It occurs to me if the Government is to charge at a rate sufficient to build up the reserve to protect the Government's liability, that puts the Government squarely and fully in the insurance business, and I don't believe any of us want that to happen.

Further than that, we recognize that it is not necessary, because of the great improbability, that this liability will ever take place.

On the question of whether there should be a minimum charge, if any, it seems to me that there should be. If a minimum or no charge is fixed for this excess liability, then that is undoubtedly tantamount to a giveaway, a direct subsidy, a replacement of private liability for this excess liability, and replacing that by public indemnity, that is, a direct subsidy, which most of us would be loath to grant.

I do think there can be justified requiring of the private operator to share in some reasonably measurable degree the obligation of paying this excess liability if it should occur. To absolve him of that liability means that the responsibility is placed on the shoulders of the taxpayers generally and the Federal Treasury generally, and relieves the private capitalists from paying that liability.

It would put the obligation entirely on the Government and relieve the private capital. To put the obligation on the private capitalist means that the Government isn't going to incur that liability at all, so there has to be some fair balance between the two, requiring the licensee to bear some of this excess cost through his rate and the balance of it to be picked up by the Federal Treasury for the good of the country and the welfare of the country generally to get on with this program. I think there is justification for requiring a reasonable rate of insurance which will not be a deterrent.

Mr. PRICE. That is our position.

Chairman ANDERSON. Go ahead, Mr. Price.

Mr. PRICE. Mr. Chairman, the protection which our proposal would afford applies only to holders of construction permits and holders of licenses for production and utilization facilities and other persons associated in the design, manufacture, construction, and operation of such facilities.

It would apply only to liability to the public for injury or damage resulting from hazardous properties of source, special nuclear and byproduct material. The protection would not apply to loss or damage caused by bad faith, willful misconduct or gross negligence on the part of the person indemnified—if such person is not a corporation—or any officer or officers of the person indemnified—if such person is a corporation—or on the part of the plant manager, plant superintendent, or equivalent representative of such person.

Chairman ANDERSON. Does that adequately protect the public, or does it penalize the public? Shouldn't the public be allowed to collect and then let the Government have its right of redress back to the operating agency if it exercises gross negligence or willful misconduct?

Mr. PRICE. If you view this as primarily a problem of disaster insurance to the public, we would certainly agree, but this is a problem of taking care of the third-party liability of the people who have said they will not be able to come into this business unless that liability in the higher amounts is taken over by the Government.

Chairman ANDERSON. Then you view it solely as an attempt to protect the stockholders of the company?

Mr. PRICE. I hate to say solely, because except in the case of bad faith or misconduct of a few people like the corporate officers and plant managers, the public would be protected. In no event would this affect the public's right to sue.

Chairman ANDERSON. Yes; but it couldn't collect.

Mr. PRICE. This will make the collection possible except in the single case of bad faith of these top officials.

Chairman ANDERSON. Yes; but that is the very point.

Mr. PRICE. Sir, our problem was to justify offering this protection even to a company in the case where it was shown that the accident resulted from misconduct of the top officials.

Chairman ANDERSON. It doesn't say that. [Reading:]

Gross negligence on the part of the person indemnified (if such person is not a corporation).

Mr. PRICE. That would be in the case of an individual.

Chairman ANDERSON (reading):

Or any officer or officers of the person indemnified (if such person is a corporation) or on the part of the plant manager, plant superintendent, or equivalent representative of such person.

I think it comes down to the question of what is the concept of this. If the claim can run, as somebody said, $500 million, is it your theory then that the person that needs protection is the composite group of individuals, say, General Electric and Commonwealth Edison, and the various other groups, whose total capital may accumulate to $500 million and might be wiped out by this one accident.

Mr. PRICE. That is right.

Chairman ANDERSON. My concept was it was individuals that might be damaged up to the extent of $500 million that you were trying to protect. Go ahead. I was just trying to find out. This sounds as if that is what it is, and I don't believe you can hardly justify the Government assuming the full responsibility if all you are trying to do is protect shareholders.

Mr. PRICE. What we are trying to do is remove the roadblock that will assure that these companies will move into the program.

Representative COLE. Why shouldn't sabotage be included in this assumption?

Mr. PRICE. Sabotage by a corporate officer would be an exception. Sabotage isn't usually committed by a corporate officer.

Representative COLE. I am wondering, if you are going to exempt liability for gross negligence, why you should sabotage?

Mr. PRICE. Mr. Cole, what we are saying is that regardless of the cause of the catastrophe, whether it is sabotage or what, if it results in a liability of the company to third parties, this indemnity will cover the company except in these cases of bad faith.

We haven't thought in a case of overt acts of sabotage causing an accident that the company ought to bear the financial responsibility. We would include that in the coverage.

Representative COLE. Are you saying that the company should absorb the total excess liability for third-party claims caused by sabotage?

Mr. PRICE. We do not, and our plan would protect the company against the third-party claims in that event.

Chairman ANDERSON. You just carry over this provision from regular Government contracts?

Mr. PRICE. That is right. We have tried to make this consistent with the provisions in the contracts in the operation of Government-owned plants.

Chairman ANDERSON. I want to urge you to take a little look and see what the people living next to a reactor might feel about protecting the corporate interest and protecting the Government and not protecting them.

Go ahead.

Mr. PRICE. The next point that I had to cover, Mr. Chairman, was the question of the amount of liability which the industry should assume. I think we have generally already covered that.

We have come out with the position that the Government indemnity or reinsurance should apply only to losses in excess of the amounts of insurance against third-party liability which are determined to be available commercially.

On the basis of present indications from the insurance industry, this would mean that the Government indemnity would cover loss exceeding approximately $65 million per plant.

We thought of other methods of arriving at the point where the Government indemnity would take hold, but we believe that this approach has the advantage of keeping the Government entirely out of the insurance field that can be occupied by the private insurance industry. It is true that there is some uncertainty and will be until the insurance companies have come up with rates, but we think at the present time we ought not to occupy that field and ought to give the insurance industry and the atomic-energy industry the maximum opportunity to work out the program within that area.

Chairman ANDERSON. This suggested law that you have, this section (3), says:

> The liability covered shall be only that which is in excess of the amount of nongovernmental insurance against such liability generally available on the open market.

So if a college had a research reactor, and the college was prepared to take out $65 million of insurance before there would be any overriding Government——

Mr. PRICE. No, sir.

Chairman ANDERSON. Did I read this right, then, or not?

> The liability covered shall be only that which is in excess of the amount of nongovernmental insurance against such liability generally available on the open market as determined by the Commission.

Is the $65 million available?

Mr. PRICE. Yes, sir.

Chairman ANDERSON. Therefore, if $65 million is available, a college operating a reactor could not depend for any general governmental protection or even apply for it until it had bought $65 million of coverage; is that or is that not right?

Mr. PRICE. That is not right.

Chairman ANDERSON. Will you explain why it is not right?

Mr. PRICE. Yes, sir. The key word in what you read was "amount." The Government's indemnity would begin as you said at $65 million. We wouldn't require any company——

Chairman ANDERSON. Just a minute. Explain that key word "business." I read you the language. Will you ask your attorney whether or not that is a correct interpretation of that?

Mr. MITCHELL. There is no requirement, Senator, that the private insurance be taken out up to the point of $65 million.

Chairman ANDERSON. We will go back and look at it. What I tried to say was that if a college is running a reactor, the possibility of the Government protecting it for excess claims was not available to it unless it bought $65 million worth of primary coverage.

You read the section and tell me how it is available.

Mr. MITCHELL. The point I am trying to make is our coverage is available whether or not the college buys $65 million.

Chairman ANDERSON. Let me read it to you:

> The liability covered shall be only that which is in excess of the amount of nongovernmental insurance against such liability generally available on the open market.

Mr. MITCHELL. Yes, sir.

Chairman ANDERSON. How much is available on the open market?

Mr. MITCHELL. $65 million.

Chairman ANDERSON. So the Government liability comes in at what point?

Mr. MITCHELL. At $65 million.

Chairman ANDERSON. That is what I tried to say. They can't get it unless they buy $65 million.

Mr. MITCHELL. No, sir. That is not right. They can get it at $65 million whether or not they buy a penny of private insurance.

Chairman ANDERSON. You mean they can get protection above $65 million? Yes, but they would like to buy $5 million and that is all they can afford, so the gap between $5 million and $65 million will remain open?

Mr. MITCHELL. That is right.

Mr. PRICE. Self-insured.

Chairman ANDERSON. How does the public recover?

Mr. PRICE. Senator Anderson, the public would recover to the extent that the assets were there.

Chairman ANDERSON. The assets won't be there in a college reactor.

Mr. PRICE. In the small college reactors we have never yet been told that insurance was a problem. These people regard these small reactors as being relatively safe, and I am sure we do, too. A couple million dollars worth of insurance is all that they are thinking about buying and they are going ahead with their projects, and that is our basis for not entering that field.

Chairman ANDERSON. So this is primarily again for the protection of the trustees of the college and not for the public? I just don't follow you on the theory that the public has no rights in this. The only basis on which you would bring the Government in, it would seem to me, would be to protect the public in this matter. It might otherwise have a great disaster and be unable to cover anything.

Mr. PRICE. This protects the public in the event of disasters that cause losses in excess of $65 million where the owner elected to buy the indemnity that the Government offers; that is right.

Chairman ANDERSON. Let's assume that that is true for a minute. In this Commonwealth Edison project—Commonwealth Edison is in the picture—doesn't it have some assets?

Mr. PRICE. Yes, sir.

Chairman ANDERSON. Several hundred million. Doesn't General Electric have some assets?

Mr. PRICE. Yes, sir.

Chairman ANDERSON. Doesn't the Bechtel Corp. have some assets? Quite a little. So until the assets of Commonwealth Edison and General Electric and Bechtel and everybody else have been exhausted, the public would still be protected.

Mr. PRICE. No, sir. They could buy the $65 million and then buy this protection on top of it, or they could decide to be self-insured.

Chairman ANDERSON. I am afraid we are not talking about the same thing. Suppose they bought $65 million and the Government didn't insure? Wouldn't the public have protection up to the total amount of assets of General Electric?

Mr. PRICE. That is correct.

Chairman ANDERSON. Isn't that what General Electric's interest is in this?

Mr. PRICE. Right.

Chairman ANDERSON. That is what I thought. I don't blame them for that interest. I merely say the public has some rights, too. It isn't just General Electric and Commonwealth Edison. Why do they have a driver's liability law in this State—to protect the driver or to protect the public?

Mr. PRICE. Senator, to protect the public.

Chairman ANDERSON. That is a little bit of what I thought.

Mr. PRICE. However, as I said previously, we have not approached this from the standpoint of disaster insurance to protect the public. We are assuming that in the case of a disaster under conditions where the public doesn't get protected, it would be a special problem for Congress to deal with.

Here we are trying to remove a roadblock that has been said to interfere wtih people getting into this program, and that is frankly the basis on which we have approached this problem.

Chairman ANDERSON. The reason we get to small reactors such as the college reactor is the fact that among our applicants you have a consumers power district out in Nebraska. I don't know what you think they are going to do in their reactor. My understanding is they are not going to do research, but they are going to try to develop power.

Mr. PRICE. That is right.

Chairman ANDERSON. My concept is they are going to have to buy out of this language $65 million worth of insurance before the Government insurance will become effective, and you have agreed with that.

Mr. PRICE. That is right. This proposal would not put us into the area where the insurance companies can operate. It it turns out the rates toward the upper reaches of $65 million are too prohibitive either for the big or little reactors, maybe we would have to take another look.

Chairman ANDERSON. That might happen. I believe it might be possible for a man to pay insurance on his wife's jewelry up to $10 million, but it just happens that I don't need that much. Should I have to buy that much? Should the consumer power district out in Nebraska have to buy $65 million if that made their project infeasible?

Mr. PRICE. No, sir.

Chairman ANDERSON. You see, if you just deal with 2 or 3 large companies, you may completely remove this company up in Minnesota that announced the other day it was going to get an REA loan and try to deal with the Atomic Energy Commission.

Mr. PRICE. We don't know whether the rates for the full $65 million for that powerplant will be prohibitive or not. If that is a small plant, conceivably the rates for everything over $10 million of coverage might be extremely low. We just don't know.

Chairman ANDERSON. Then don't you think you might wait before you put a provision like this in your bill?

Mr. PRICE. We thought the best thing to do was to give the insurance industry and the Atomic Energy Commission a chance to work out a program within the area of the $65 million. If the insurance industry doesn't succeed in a satisfactory program in that area, then we would have to take another look. That was our approach.

Chairman ANDERSON. I do think that different risks might be entitled to pick up this protection at different levels.

Representative COLE. The question that you have asked, Mr. Chairman, raises some doubts in my mind as to my understanding of the bill.

I had thought—and I admit I haven't read the bill—that the Commission proposal was that the Commission itself would determine the degree and extent of liability of each licensee and that over and above that liability the Commission would grant indemnity.

Is that incorrect?

Mr. PRICE. That is incorrect, Mr. Cole. We spent a long time working on that basis, but every criterion or formula that we thought of that would make that kind of a determination inevitably came out with some bad results for individual cases and in all cases it involved fixing the point of the beginning of the Government indemnity in the area where the insurance company can operate, and in many cases where we know the purchasers of insurance have gone ahead.

Chairman ANDERSON. You have said several times here today that you fixed this point where this Government insurance is. How do you fix that point?

Mr. PRICE. What we said is that the Commission will, from time to time, make a determination of what is the maximum amount of private insurance available and this is the point, as determined from time to time.

In other words, if $65 million is the amount of private insurance available when this program starts, then under this proposal the Government indemnity would begin at $65 million.

Representative COLE. I am inclined to agree at the moment, at least to a degree, with your decision. As I see it, it would be a matter of great concern, giving the Commission the authority and responsibility of fixing piece by piece, applicant by applicant, the extent of his liability.

In the first place, it would be a burdensome thing.

Mr. PRICE. Very burdensome.

Representative COLE. And you would be open to the temptation of favoritism. It certainly would subject the Commission to the charge of favoritism, or bias, or discrimination, so I think perhaps the decision of the Commission to be arbitrary about it and say, "Every one of these operators of the reactors is going to have to in some fashion or other provide for his own protection up to whatever he wants, but we will pick it up if it exceeds $65 million," is sound.

Now, that does at first blush indicate an unfairness to the small college reactor or the individual private man who wants to buy a reactor or does appear to be unfair to the cooperative, but I fancy that those situations will be adjusted privately between the individual concerned and the insurance people.

Mr. PRICE. That is our hope.

Representative COLE. The insurance people will recognize and say, "Here is an operation that is negligible. The power is a pittance. It doesn't amount to much. The probable liability isn't over $2 million or $3 million, so we will give you a policy of, say, $65 million, but the rate you are going to have to pay for protection is down, so you are going to pay for just the protection."

It does occur to me that there are great dangers in leaving it up to the Commission to fix the liability.

Mr. PRICE. That is right. Everything that you said would be a problem, and then we considered fixing the limit using such factors as power level on the basis of a formula so we wouldn't have the charge of favoritism or unfair decision, and every time we reached a formula like that we came out with very odd results.

If you take the power level, you can make a formula that will come out to a fair amount of insurance or liability to be assumed, say, for the big reactors and then it comes out with 10 cents worth of insurance for the zero power reactor, so we had to abandon formulas based on those criteria.

Chairman ANDERSON. I know you are anxious to finish this morning.

Representative COLE. Mr. Chairman, you have raised in your questions a conflict of philosophy of this bill which I would like to have either Mr. Price or Mr. Mitchell discuss, and that is whether the bill is predicated on the philosophy of insuring the public against the risks, damage, or injuries that might occur, or is it based on the philosophy of indemnify the man against losses which he might incur by reason of claims made against him in the operation of these reactors?

They are different philosophies.

Mr. PRICE. That is right. The objective is to indemnify the man who has liability in these high areas, but so far as the public is concerned, this puts the public in exactly the position it is in with respect to any other industrial undertaking where insurance is available.

This is making sure that insurance in one form or another will be available and whether the company takes the maximum is somewhat like it is in other industries. Sometimes companies don't take the maximum they could buy, and to that extent the public isn't protected.

In other words, it is essentially as you say.

Representative COLE. The net result is pretty much the same. The innocent, the injured, or the harmed public is given a source of redress

for his damage, so the net result is about the same, but the philosophies are quite different.

Mr. PRICE. That is right. We thought that on the question of the cases where the public wouldn't be protected under this approach would be cases for special consideration by the Congress, unless separately Congress decided to embark on a disaster-insurance program in this field.

Our immediate problem was to get the roadblock removed.

Chairman ANDERSON. Ancher Nelson, I think, approved as his last official act yesterday, his last day in office, this $6 million application for the REA in Minnesota.

Representative COLE. Was there doubt in your mind about the final decision?

Chairman ANDERSON. I thought he would be in favor of it. Mr. Cole and I were down at a luncheon for Mr. Nelson yesterday. We thought he was going to be in favor of it. He was in favor of it.

I would say it would be a sort of a useless act if you didn't find some way of bridging this gap, because not every company has to worry about having assets of more than $65 million.

Very well. Go ahead. I will try to refrain so you can finish before lunch.

Representative COLE. I don't like to interrupt.

Chairman ANDERSON. I want you to. I think it is very important.

Representative COLE. Does this permit the Commission to determine that applicant A has no insurance coverage but he does have assets sufficient to appeal the $65 million worth of claims? Can the Commission say, "All right, A corporation, you don't need to show me your insurance policy. Your assets are sufficient to cover you, so we will issue the permit."

Mr. PRICE. Mr. Cole, this proposal doesn't relate to that problem at all. Separately the Commission has the problem for consideration, and we have not resolved it yet, as to whether or not as a condition of a license to operate we will require a showing of a minimum amount of resources either in insurance or bonds or cash in the bank or other assets.

That is a separate problem. You see, we might decide that, for example, in order to allow a company to operate, they ought to make a minimum showing of X million dollars worth of resources to cover something that might be determined to be normally expected losses, but that might be a totally different amount than the amount of insurance they might decide to buy for their own protection.

Representative COLE. I don't see why it isn't a subject to be covered in this bill.

Mr. PRICE. We will have the authority in the basic statute to require financial showing as a condition of issuing the license.

Representative COLE. I recall in the seminar discussion that the committee had back during the winter when the insurance people and corporate operators were down. Some of the corporate operators said, "Why do you require us as operators to obtain insurance? We may want to incur that risk ourselves without running the cost of carrying insurance on it. Our assets are sufficient to liquidate any claims, so why require us to carry insurance," and I was quite persuaded by the argument.

You say that is not covered in the bill?

Mr. PRICE. No. The Atomic Energy Act of 1954 already gives the Commission authority to determine what amount of financial responsibility the company will have to show in order to get a license.

This doesn't deal with that problem. This deals with the problem of taking care of the catastrophic losses which we would never require as a showing.

Representative COLE. Is this bill permissive on the Commission or mandatory?

Mr. PRICE. I think it says the Commission is "authorized." It is permissive.

Representative COLE. That covers it, I guess. You wouldn't have to have the showing of an insurance policy of a licensee who had assets enough to take care of the liability.

Mr. PRICE. That is right, Mr. Cole, and that question comes up when we issue the license. If the Commission decided that a company ought to have $20 million worth of resources in order to operate the reactor, the Commission has authority under existing legislation to determine whether to let that be self-insurance or purchased insurance.

Chairman ANDERSON. Proceed.

Mr. PRICE. Mr. Chairman, the only other major point that I had to mention was the question of whether there should be a top limit on the amount of protection or indemnity to be offered in each individual case, and briefly, our position is simply that since the size of the risk involved cannot be accurately estimated, we recommend that the legislation not place any ceiling on the amount of the indemnity or reinsurance coverage to be afforded to the licensee.

Under this proposal, the amount in each case would be determined by the amount which the licensee decided to buy. In other words, the authority in this bill to the Commission would be unlimited as to the amount of an indemnity or reinsurance agreement we could write.

It would get determined in each individual case by the amount that the licensee decided he wanted to pay for it.

Chairman ANDERSON. If the rate on the upper limit was approaching zero, why would he ever stop?

Mr. PRICE. I think before it gets to zero, we would have to level it off so that he would come to a stop.

Chairman ANDERSON. But the last several hundred million dollars, you thought, would be very low.

Mr. PRICE. They would certainly be lower than the first increments. Even when it gets low, I suppose a time comes when anybody buying liability insurance decides it just isn't worth the extra dollars for any more protection.

Chairman ANDERSON. Will you discuss your provision on page 9, item 5?

Mr. PRICE. That, Mr. Chairman, is a provision which we understand is common to Government insurance programs. Briefly, it would establish a fund which is called in the bill the Federal atomic hazard indemnity fund.

The section of the bill would require that the net proceeds from payments collected from the industry for the indemnity or reinsurance agreement would be deposited in this fund. Frankly, it is no intention that those deposits, as we have already said, would build up to a reserve.

Chairman ANDERSON. If they aren't, why do you have the fund and why do you get $500 million of working capital?

Mr. PRICE. What we are doing here is, we understand, following the pattern of Government insurance programs in other fields.

Chairman ANDERSON. But this doesn't follow the pattern of the Government hazards in other fields.

Mr. PRICE. That I would have to concede.

Chairman ANDERSON. Then why follow them?

Mr. PRICE. It is in the nature of an insurance or indemnity program and it is insurance or indemnity.

Chairman ANDERSON. No. The crop insurance is a direct insurance program. This is a reinsurance program or indemnity program. They are wholly different.

Mr. PRICE. The point is that one way or another, the Commission would have to be in a position to get its hands on some money in case a loss occurred.

Chairman ANDERSON. It would only get its hands on money when it was a loss over $65 million.

Mr. PRICE. That is right.

Chairman ANDERSON. When it got on a loss over $65 million at any one time, it would be of sufficient importance to the general public so that Congress should proceed to do something about it, and until there were adjudicated claims for any more than $65 million, the money wouldn't be necessary anyhow.

Mr. PRICE. This is set up on the assumption that so far as this $500 million Treasury borrowing is concerned, the authority wouldn't need to be exercised except as the money were needed, so in that sense it probably has advantages over the appropriate process.

Chairman ANDERSON. What advantage?

Mr. PRICE. We just don't need any money until we have a loss.

Chairman ANDERSON. That is right. So why do you set up $500 million until you know that there is a $65 million claim somewhere?

Mr. PRICE. This doesn't set up the $500 million. This just authorizes the borrowing up to that amount to the extent that the money is needed.

Chairman ANDERSON. It doesn't say that.

Not exceeding $500 million outstanding at any time in order to finance activities under this bill.

It could start a whole group of people going around and surveying rates and trying to decide what the rate ought to be and determining how many people would be employed in the insurance section.

I gave a classic example to someone the other day where one-hundred-and-sixty-odd people were working in some Government program. The office was abandoned and the duties assigned part time to one man. They were in a rental section for people who didn't rent Government property, and here you have people who go out and run through the rates and say, "Should we charge General Electric ninety-nine ten-thousandths of 1 percent or ninety-eight ten-thousandths? Let's survey this." And 150 people could study General Electric for 5 years and be financed out of this.

Why don't you wait until you need the money?

Mr. PRICE. I think that this was not intended to cover administrative expenses. Item (g) in the bill says that the money in the

fund could be used to pay approved claims under indemnity contracts and reinsurance agreements.

Well, it says "and other expenses." I guess I will have to ask Mr. Mitchell to respond to matters of administrative expense.

Mr. MITCHELL. Our intention with respect to the borrowing part was not to borrow with respect to administrative expenses. I think if we made it read "finance payment of approved claims" or something of this kind, it would meet our intention a little better.

Chairman ANDERSON. It says "to pay approved claims."

Mr. MITCHELL. This would be just an initial working fund. If the total amount of claims ran over $500 million, then, of course, we would have to come back to Congress for an additional appropriation.

Chairman ANDERSON. Is that true? I am just looking at the item itself. You say that money in this fund may be used for the following purposes:

(1) To pay approved claims; but (2) to pay to the Secretary of the Treasury sums borrowed from him, with interest, in accordance with the provisions of subsection (f).

Then you go back to subsection (f). You know in the insurance business they say you have to read the fine print, and I am going to do that:

(f) In order to finance activities under this section, the Commission is authorized to issue to the Secretary of the Treasury, from time to time, notes or other obligations not exceeding $500 million.

Mr. MITCHELL. Mr. Chairman, I think the matter would be cured if it were made to read:

in order to finance payments of approved claims.

That is what we intended.

Chairman ANDERSON. Then you take out section (2) entirely?

Mr. MITCHELL. No, sir, because the (g) referring back to (f) again would contemplate approved claims. That is what we had in mind.

Chairman ANDERSON. You mean the very beginning of line (f), "in order to pay approved claims"?

Mr. MITCHELL. Yes, sir, that was our intention.

Mr. PRICE. If we had a loss at a time when Congress wasn't in session, we would want to be able to get our hands on some money to start paying.

Chairman ANDERSON. May I suggest out of my rather peculiar experience with the insurance business that if you have a loss over $65 million, by the time you start to find all the claimants in all the parts of the country and have to pay out that first $65 million, Congress may be back in session before you actually pay the rest of the claims.

I don't know any claimant that is going to get it done the first month.

Mr. PRICE. So far as settling the great bulk of them, I would have to agree.

Chairman ANDERSON. You ought to ask sometime how long it takes to pay large claims, not claims running up into millions of dollars based on complex situations such as an explosion in a nuclear plant.

Mr. PRICE. I would like to make one further point in connection with this borrowing authority. I think it probably is already clear that the $500 million limitation on borrowing is not intended in the bill as a limit on the amount of the indemnity or reinsurance coverage that could be issued.

As I explained, the bill proposes that that would be determined by the amount that the particular person decided to buy and would be a commitment of the Government. There are some other minor points of the bill; perhaps I could just insert them in the record.

Chairman ANDERSON. Yes, sir; I think they better be inserted in the record, along with the draft bill.

(The material referred to follows:)

5. The bill has a provision, which we understand is common to Government insurance programs, which would establish a fund for use by the Commission in carrying out the indemnity program. The net proceeds from charges collected for the indemnity or reinsurance agreements would be deposited in this fund. The Commission would be authorized to issue to the Secretary of the Treasury notes or other obligations in an amount not exceeding $500 million outstanding at any time in order to finance activities under this bill. However, this limitation on borrowing authority would not be a limitation on the amount of indemnity or reinsurance coverage which the Commission could issue.

6. The provisions of the Government Corporation Control Act would be made applicable to functions authorized in the bill.

7. The bill further provides for submission of an annual report to the President and the Congress including any recommendations that are deemed advisable.

The Commission believes that this type of bill provides the best solution to the problem at this time. After the insurance industry develops the terms of its coverage, including rates, we will be better able to appraise the ability of the industry to meet the requirements of the atomic-energy industry. It may then be desirable to consider amendments.

The main differences between our proposal and the bill H. R. 9701 introduced by Congressman Price are: (1) Under our proposal, the Government indemnity would operate only for losses above amounts of private insurance available rather than amounts of private insurance deemed reasonably adequate by the Commission to provide against normal contingencies; (2) the protection offered by our proposal would be subject to a charge; (3) the amount of protection in each case would be determined by the amount of indemnity or reinsurance which the licensee elected to purchase.

I should also point out that, under the Commission's proposal, there would be no requirement that the atomic energy industry buy any particular amount of private or Government insurance. The companies would be free to assume the liability without insurance. The Government indemnity simply would not be effective as protection within the amounts determined to be insurable.

We have carefully considered the approach of limitation of liability and do not recommend this method primarily on account of doubts as to constitutionality of this approach. Also limitation of liability does not offer the degree of protection to the public that is offered by the indemnity or reinsurance approach.

The alternative outlined in Senator Anderson's letter of April 26, 1956, has been carefully considered. This alternative would fix the limit of the Government indemnity at $500 million, would limit liability of the licensee at that figure, would require the industry to assume the risks up to amounts determined by the Commission on a nondiscriminatory basis to be a reasonable amount of insurance at reasonable rates, and would make a charge for the Government indemnity, the proceeds of which would go into a fund for safety research and development.

Since, as previously stated, we don't know the probabilities of a catastrophe or the magnitude of loss in case one should occur, it would be extremely difficult to make a determination of a reasonable amount of insurance or reasonable rates. Such determinations would put the Government indemnity in a field occupied by the insurance industry. As previously stated, we feel that our proposal has the advantage of giving the atomic energy industry and the insurance industry the opportunity to work out this program to the limit of available private resources.

For the same reason that we don't have any reliable information as to the size of a possible loss, we have no sound basis for fixing the limit of the indemnity at $500 million, or any other particular figure.

Again we would like to emphasize that we don't expect accidents causing damage in excess of the large amounts of coverage that the insurance industry has indicated it will offer. The very comprehensive licensing procedure established by the Atomic Energy Act is designed to give every reasonable assurance

that such large accidents will not occur, and we intend to administer the licensing program in such a way as to reduce the probability of such accidents as close to absolute zero as possible.

It is because we cannot guarantee against the remote possibility of a catastrophe that we are recommending legislation in this field.

AN ACT To amend Chapter 14 of the Atomic Energy Act of 1954

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That Chapter 14 of the Atomic Energy Act of 1954 is amended by adding thereto a new section to be known as section 169–1, with appropriate listing to be made in the Act's table of contents, and to read as follows:

"SEC. 169–1. INDEMNITY

"(a) The Commission is authorized, at any time within ten years from the date of enactment of this section, to enter into an agreement with any holder of a permit or license (except those issued to another Government agency) for the construction or operation of any production or utilization facility within the United States to indemnify and hold harmless such permittee or licensee and any owner, operator, manufacturer, designer or builder of such facility or any part thereof and any supplier of equipment, material or services for such facility against liability to persons (including employees and agents of the Commission) for death, bodily injury and property damage, including loss of use. Each such indemnity agreement may be issued for the full term of the permit or license and shall be subject to the following conditions:

"(1) The Government shall have no obligation under the indemnity agreement for liability to persons indemnified under such agreement.

"(2) The Government shall have no obligation under the indemnity agreement for claims of employees of persons indemnified which arise under State or Federal Workmen's Compensation Acts.

"(3) The liability covered shall be only that which is in excess of the amount of non-governmental insurance against such liability generally available on the open market as determined by the Commission from time to time, such determination to take effect on the next anniversary date of the indemnity agreement.

"(4) The liability covered shall include only that which arises out of or results from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the construction or operation of the facility.

"(5) The liability covered shall be limited to that which results from occurrences during the effective term of a permit or license authorizing the construction or operation of such facility.

"(6) The Government shall have no obligation under the indemnity agreement for loss or damage caused by bad faith, willful misconduct or gross negligence on the part of the person indemnified (if such person is not a corporation) or any corporate officer or officers of the person indemnified (if such person is a corporation) or on the part of a plant manager, plant superintendent or equivalent representative of the person indemnified.

"(b) The Commission shall make an annual charge for indemnity coverage at such rates as it deems reasonable after taking into consideration (1) the scale of premiums charged or which would be charged by private insurance companies for public-liability coverage of the facility involved and (2) the objective of establishing rates which will not tend to discourage widespread participation in the development and utilization of atomic energy for peaceful purposes. Such rates shall be established for each increment of indemnity coverage as determined by the Commission. The basis for such rates shall be incorporated in a schedule which shall be published by the Commission.

"(c) The Commission is also authorized, at any time within ten years from the date of enactment of this section, to enter into agreements with private insurance companies reinsuring such companies for insurance coverage provided by them to any holder of a permit or license (except those issued to another Government agency) for the construction or operation of any production or utilization facility within the United States and any owner, operator, manufacturer, designer, and builder of such facility and any supplier of equipment, material or services for such facility against liability to persons for death,

bodily injury, and property damage, including loss of use. Each such agreement of reinsurance shall be subject to the conditions specified in subsection (a) of this section with respect to agreements of indemnity. The Commission shall make a charge for such reinsurance coverage, at such rates as it deems reasonable after taking into consideration the scale of premiums to be charged by such private insurance companies for the coverage which is so reinsured.

"(d) Each indemnity and reinsurance agreement shall be in writing and shall take effect upon its execution. It shall include such terms and conditions, not inconsistent with this section, as the Commission deems appropriate.

"(e) There is hereby established a Federal Atomic Hazard Indemnity Fund for use by the Commission in carrying out the functions authorized by this section. The net proceeds derived by the Commision from indemnity fees and reinsurance premiums collected under subsections (b) and (c) shall be deposited in the Federal Atomic Hazard Indemnity Fund. Moneys in the fund not needed for current operations of the Commission under this section may be invested or reinvested by the Commission, with the advice of the Secretary of the Treasury, in all obligations which are lawful investments for fiduciary, trust, or public funds of the United States.

"(f) In order to pay settlements to pay approved claims under this section, the Commission is authorized to issue to the Secretary of the Treasury, from time to time, notes or other obligations in amount not exceeding $500,000,000 outstanding at any time. Such notes or other obligations shall be in such forms and denominations, have such maturities, and be subject to such terms and conditions, as may be prescribed by the Commission with the approval of the Secretary of the Treasury. The Secretary of the Treasury is authorized and directed to purchase any notes or other obligations of the Commission to be issued hereunder and for such purposes the Secretary of the Treasury is authorized to use as a public debt transaction the proceeds from the sales of any securities issued under the Second Liberty Bond Act, as amended, and the purposes for which securities may be issued under such Act, as amended, are extended to include any purchase of such notes or obligations. The Secretary of the Treasury may at any time sell any of the obligations acquired by him under this section. All redemptions, purchases, and sales by the Secretary of the Treasury of such obligations shall be treated as public debt transactions of the United States.

"(g) Moneys in the Federal Atomic Hazard Indemnity Fund may be used for the following purposes as deemed necessary by the Commission: (1) To pay approved claims under indemnity contracts and reinsurance agreements and other expenses incurred under this section, and (2) to pay the Secretary of the Treasury sums borrowed from him, with interest, in accordance with the provisions of subsection (f).

"(h) In the performance of its functions under this section, the Commission may determine the character of and the necessity for its obligations and expenditures, and the manner in which they shall be incurred, allowed, and paid, subject to the provisions of law specifically applicable to Government corporations.

"(i) The provisions of the Government Corporation Control Act, as amended, shall apply to the functions vested in the Commission in this section, to the same extent as applicable to wholly owned corporations.

"(j) The provisions of section 53.e (8) shall not apply to the liability assumed by the Government under indemnity or reinsurance agreements executed pursuant to the authority of this section.

"(k) In the administration of indemnity and reinsurance agreements entered into hereunder, the Commission shall use, to the maximum extent practicable, the facilities and services of private insurance companies and of established insurance agents and brokers and established insurance adjustment organizations and the Commission may contract to pay a reasonable compensation for such services. Any contract made under the provisions of this subsection may be made without regard to the provisions of Section 3709 of the Revised Statutes, as amended, upon a showing by the Commission that advertising is not reasonably practicable.

"(l) Nothing in this section shall be construed to except any real property, acquired and held by the Commission in connection with the payment of any claim under this section, from taxation by any State or political subdivision thereof, to the same extent, according to its value, as other real property is taxed.

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"(m) The Commission shall, not later than one year after the passage of this section and annually thereafter, submit to the President and to the Congress a report of activities under this section, including therein such recommendations as may be deemed advisable."

Chairman ANDERSON. I am sorry this has been so long. We will be back at 2 o'clock. I know, Mr. Chairman, you have some obligations.

Mr. STRAUSS. Before the Senate Foreign Relations Committee.

Chairman ANDERSON. We will be happy to release you for that.

Mr. STRAUSS. I will be back in as soon as that is over.

(Whereupon, at 12:35 p. m., the committee recessed, to reconvene at 2 p. m., the same day.)

AFTERNOON SESSION

Chairman ANDERSON. The committee will come to order.

Dr. Libby, will you proceed?

STATEMENTS OF DR. WILLARD F. LIBBY, COMMISSIONER; HAROLD S. VANCE, COMMISSIONER; THOMAS E. MURRAY, COMMISSIONER; K. E. FIELDS, GENERAL MANAGER; HAROLD L. PRICE, DIRECTOR, DIVISION OF CIVILIAN APPLICATION; DR. C. R. McCULLOUGH, DIRECTOR FOR REACTOR SAFEGUARDS; WILLIAM MITCHELL, GENERAL COUNSEL; W. KENNETH DAVIS, DIRECTOR, DIVISION, REACTOR DEVELOPMENT; DON S. BURROWS, CONTROLLER, DIVISION OF FINANCE, ALL OF THE ATOMIC ENERGY COMMISSION—Resumed

Dr. LIBBY. The first witness this afternoon, Senator, will be Dr. C. Rogers McCullough, Chairman of the Advisory Committee on Reactor Safeguards.

Dr. MCCULLOUGH. Mr. Chairman and gentlemen, as Chairman of the Advisory Committee on Reactor Safeguards, it is a pleasure and a privilege to appear before this committee and give whatever help I can on the problem of insurance legislation. I thought it was worthwhile to give a brief general summary of the nature of nuclear reactors, the things that can go wrong with them, and the methods of preventing accidents.

Perhaps some of this ground will be old, and much of it will be, but there may be a few new points that will develop here.

This dicussion deals entirely with the technical problems, how they are related to making reactors as safe as possible, and how there is a residual small probability of a major reactor accident.

Because the technology of nuclear reactors is still very young and nearly every reactor poses new problems, there are no standards by which we can judge reactors at this stage of the game. Because there is a very small amount of experience on reactor accidents—and it is fortunately the case that there have been no reactor accidents on regularly operating ractors—the determination that the hazard is acceptably low is a matter of competent judgment.

The way that we determine that the hazard is acceptably low is purely a matter of judgment. It is believed that the probability of a major accident involving presently operating reactors is quite low.

If future reactors are designed on the basis of equally competent and sufficient information and by equally competent persons, and operated with the same care, it is expected that the probability of a major disaster will continue to be very low.

Representative COLE. May I interrupt there?

Do you have any reason to believe that future reactors will not be designed on competent information and by competent persons based on sufficient information?

Dr. MCCULLOUGH. On the showing at the present time, sir, I have a reason to believe this. But neither do we have any assurance that this will be the case, because we cannot foresee who will be making proposals for reactors.

Representative COLE. You cannot foresee who will do what?

Dr. MCCULLOUGH. Will propose to build and design reactors.

Representative COLE. No matter who does propose or what they propose, that will not be done unless the Commission gives them an O. K. to go ahead and do it.

Dr. MCCULLOUGH. Yes. I think it is very important that the Commission make sure they are competent. That is the point I am making.

Representative COLE. I would expect that we start out with that assumption rather than as a condition as to the future. It is inconceivable that a license or permit would be granted to build a reactor which was not based on competent and sufficient information in the judgment of competent persons.

Dr. MCCULLOUGH. I think this is the right attitude, sir.

Care must be taken to insure that there is a low probability of accidents with nuclear reactors because these machines store fission products. I think it is worth reiterating that these products are more toxic per unit weight than any other industrially known materials by a factor of a million to a billion. It depends on what standards you take. If these materials should be permitted to escape there is a possible hazard to large numbers of people and many square miles of territory.

Because of this possibility of a major disaster, even though it has a low probability, it is justifiable to take unusual precautions that the design, construction, and operation are sufficiently conservative.

I think it is worth while pointing out that for the first time in any major industrial development an attempt is being made to foresee the possible accidents or disasters, and to take positive steps to prevent them. The introduction of this new philosophy poses difficult problems. But because of the potential hazard to people, and even future generations, it is imperative to face and solve these problems.

It should be made clear that the hazards associated with nuclear reactors or any other peaceful application of atomic energy are related to the highly toxic radioactive materials which are generated.

These facilities that we are talking about do not have an explosion hazard in the sense of a possible detonation which would devastate large areas by blast or heat effect.

The nuclear reaction is an exteremly dynamic one. A nuclear reactor can increase in power level thousands of times in a fraction of a second if it is improperly designed and controlled. There is no other machine that I am aware of that has this possibility of such sudden changes in energy output.

As a result, fuel elements, control elements, and the structure of the reactor itself can be melted or even vaporized if a nuclear runaway

accident should happen. By the proper careful design and the inclusion of reliable controls and safety devices, it is believed that nuclear runaways can be prevented or, at least, reduced to a very low probability.

One must recognize that the best known devices are not infallible. Even such well-known things as railroad rails break, turbine shafts shatter, trolly wheels come off and locomotive braking systems fail. One must admit that there is always a possibility that a reactor accident can occur.

The dynamics of a nuclear reactor are such that if a nuclear runaway is once started no human being can respond rapidly enough to stop it. However, reactors can be designed to be self-limiting. Precautions in maintenance and operation can be taken. The reactor thus can be prevented, in all probability, from ever starting a nuclear runaway.

Care must be taken that reactor components do not pose an undue probability of violent chemical reaction. Some of the essential and desirable materials of reactor construction such as aluminum, zirconium, uranium, and their alloys can react violently with water under certain conditions. The energy release under these conditions can be more violent than the energy release of a nuclear runaway. I think this is an ironical situation in this field. And, as you well know, water is one of our preferred moderating and cooling materials.

Precautions must be taken to assure that these conditions have a very low probability of occurring. Again it should be emphasized that even if a chemical reaction should occur and a large amount of energy released, there would not be a detonation.

Nuclear reactors have another characteristic which is unique. After the nuclear reaction is shut off heat continues to be evolved at a decreasing rate. Immediately after the cessation of the nuclear reaction, the afterheat, due to radioactive decay of the fission products, is approximately 10 percent of the heat released during operation. This decreases quite rapidly over a day or so to only a few percent.

Because nuclear reactors are generally designed to have a high specific power, this afterheat effect may cause very serious damage. Actually many reactors would melt down if the forced cooling were not continued for some time after shutdown.

If the fission products are contained in the fuel elements, they can be released during the melting period. Moreover, molten uranium, zirconium, or aluminum are more susceptible to reaction with air or water than the solid metals. This afterheat effect persists at a decreasing rate for a long time, and if adequate heat dissipation is not provided, it is possible that portions of a reactor core might vaporize.

Specifically, a nuclear runaway could be caused by anything which would introduce reactivity more rapidly than it can be controlled either by the self-limiting features of the reactor such as negative temperature or power coefficients, or by action of the control and safety devices.

Conceivably, such increases in reactivity could be caused by removal of neutron absorbers, increase in moderating properties, unfavorable changes in positions of fuel elements, or by inherent characteristics of the nuclear properties of the fuel and reactor core. Competent design and reliable operation are counted on to avoid this.

A nuclear runaway resulting in melting or vaporizing fuel elements containing stored fission products would mean the breach of the first line of defense—the cladding of the fuel elements. In the case of large power reactors the escape of even a small fraction of these fission products is a major accident.

If the reactor container is also broken and the shielding is not designed to act as a container, the only device left to protect the public is the building or safety container.

We have used the word "container" meaning generally this shell you put around the outside of the thing.

In the case of reactors which are cooled and moderated by water a large break in the reactor vessel or anywhere in the primary loop system might result in the loss of the coolant from the reactor core. The nuclear reaction would be stopped by the loss of the moderator, but with the lack of cooling there would be serious danger of melting or even vaporizing the fuel elements with the consequent release of fission products.

Again, one must depend upon the shield, the building, or the safety container to protect the public. In the case of unmoderated reactors—in other words, the fast reactors—the time constants of the nuclear reaction may be even less than those of moderated or so-called thermal ones. A rapid rise of the power level could be caused by relatively small changes, almost minute changes, in the geometry of the reactor core.

Moreover, the introduction of any moderating substances, even in small quantities, would rapidly increase the reactivity and result in a nuclear runaway. As in the thermal reactors, this would result in the release of fission products from the core and the consequences described before.

If a violent chemical reaction should occur, it may break the reactor vessel and spread the fission products. The loss of coolant from a reactor and insufficient natural cooling could cause melting of the core. This might produce a chemical reaction. The melting of the core would result in the release of fission products just as would a nuclear runaway. The chemical reaction provides additional heat energy for their dissipation.

To trace in detail the step-by-step events in a reactor accident requires a specific knowledge of the particular reactor and an understanding of the chemical and nuclear reactions involved. Further, it involves a knowledge of heat transfer, the properties of materials of which the reactor is constructed, and of the design of the machine itself.

Reactor accidents will be prevented in the future as far as possible by the very same things which have produced the excellent safety record up to now. These are careful reactor design by competent people, careful, conscientious, and skillful operation, and adequate maintenance—and, I would like to add, a good deal of luck.

The philosophy must be preserved that the responsibility for safety is primarily the responsibility of the designer, operator, and owner of the reactor or atomic-energy facility.

Chairman ANDERSON. Doctor, is it possible to design the reactor shield so that this runaway that you have been talking about can be prevented?

Dr. McCULLOUGH. We are attempting to design reactors, sir, that will be self-limiting, so that the runaway would not happen. We have not been able to convince ourselves that with any reactor this is impossible. We think we are getting close to it, but we are not satisfied yet.

Chairman ANDERSON. Can you then devise something that will contain the explosion so that it does not get out of hand, by some sort of envelope?

Dr. McCULLOUGH. Senator, we think we have done that, but when you examine it carefully there is always a nagging doubt in your mind that there is something you have not provided for.

Chairman ANDERSON. Is the Argonne boiling-water reactor so designed that you hope it will contain an explosion if there should be one?

Dr. McCULLOUGH. Yes, sir; we think so. We think the risk we are running there has been reduced to what we call acceptable. But there is still some risk. We cannot convince ourselves that it is zero.

It should be remembered that the objective must always be the construction and operation of a reliable, safe machine, and this objective must not be lost sight of in the effort to get the necessary license approval.

I think this emphasis on responsibility back to the designer and owner and operator is very important. We never attempt to tell people how to do their job. We want to make sure that they have done it.

The AEC must maintain a highly competent staff to evaluate the hazards and review operation of reactors or atomic-energy facilities proposed. And I feel this is most important. They must make sure that the applicant for a license or the designer, constructor, and operator of a Government-owned facility has recognized the possible hazards and made positive provision to avoid them as far as possible.

To summarize, the safety record in atomic energy has been extremely good. For the good of the industry and for the good of the country it is important that the safety record remain good. It can be definitely expected that there will be reactor accidents, even though the utmost is done to prevent them. It is hoped that these accidents that occur can be kept to a minimum in number and relatively minor in consequences. Hopefully, there will never be a major reactor accident.

Care must be taken that the hazards of reactors and atomic-energy facilities be continued to be reviewed carefully and by competent people. With adequate care, it is believed that the hazards can be kept to an acceptably low value.

Chairman ANDERSON. Is the AEC setting up any formal or informal safeguards on the location of reactors and their construction and operation?

Dr. McCULLOUGH. I think Mr. Fields is going to cover that in more detail. But to answer your question, yes, they are working on that.

Chairman ANDERSON. Will these be published so that people will get to know about it?

Dr. McCULLOUGH. I think that is going to be covered later. I am sure they will.

Chairman ANDERSON. Any questions, Mr. Cole?

Representative COLE. I have no questions.

Chairman ANDERSON. Thank you very much.

Dr. Libby?

Dr. LIBBY. It is a pleasure to be here. I am very interested in this whole problem of reactor insurance and I want to make sure we approach it in the proper perspective. Mr. Strauss in his opening remarks covered this subject in a general way laying the foundation for subsequent presentations. Dr. McCullough has discussed the type of reactor failures that could occur and technical methods for preventing them.

I want to carry on from there telling you what could happen in the worst possible case of a complete shattering of the reactor core and its containing structure with total release of all fission products. This is the worst possible case. We don't think this would happen except in very remote circumstances. Mathematically, the possibility does exist, however. We, therefore, feel that the most prudent way to proceed with respect to insurance planning is on the basis of the worst possible set of conditions.

I do want to differentiate, however, between the maximum possible damage and the more likely probable damage in the event of reactor failure. I will discuss this point in some detail later.

Practical experience with reactor failure has been minimal. Hence estimates of the consequences must rely on theoretical considerations. The estimates are sensitive to the exact mechanism of the initiating incident, the rate of energy release, the meteorological conditions and the associated deposition rates of the active materials. The uncertainties in each phase combine to give an answer which is probably only valid as to order of magnitude.

Release of contents: In the operation of powerplants, practical reactors operating in the range of tens of thousands of kilowatts to several millions of kilowatts will be of eventual interest. In such reactors, with the resulting high specific power, the chief hazard in a major accident arises from the fission products which have accumulated during the operating period. The quantities of the radioactive fission products are directly proportional to the reactor power level for a given pattern of operation, and show an increase in the longer lived components with increased time of exposure of the fuel elements.

The additional fission products generated instantaneously in a runaway critical incident have such a low fraction of long-lived fission products that they do not add significantly to the existing load of hazardous materials in the operating reactor.

In other words, in the event of a reactor failure, the greatest hazard arises from the fission products which are already in the fuel elements as a result of having operated the reactor for a long time rather than those generated during the runaway period.

The emphasis on the hazard of long-lived components stems both from the persistence of radiation from deposits of such substances on the ground and from the increased hazard following deposition of one of those isotopes, namely radiostrontium, is the body by inhalation or ingestion.

In addition, there is a short-lived hazard from I–131 (8-day half life) that might damage the thyroid glands of persons in the immediate vicinity of heavy fallout; 20 to 50 millicuries I–131 will damage thyroid.

Chairman ANDERSON. Could you reduce that down to what the probabilities might be if the reactor did fail?

Dr. LIBBY. It is pretty improbable. The item is volatile. I think it is one of the minor hazards. I am more afraid of the other things than of this.

It may be assumed, of course, that a portion of the primary escaping fission products will be retained in the reactor building structure. The fraction that escapes into the atmosphere constitutes the major environmental hazard. Therefore, the damage to the surrounding country and population depends on the amount of fission products that actually escape.

Thus, in the most favorable cases with a containment structure of assured integrity, there will be no fission products release and thus no major environmental hazard will occur.

CONTAMINATION LEVELS [1]

The distance at which lethal or damaging conditions could occur is strongly dependent upon both the time and elevation of release and the meteorological conditions. Present estimates indicate lethal conditions only within the immediate vicinity of the reactor for total release from a reactor of 100,000 kilowatts and at distances of the order of 10 to 50 miles for total release from reactors in the range of millions of kilowatts.

The only real information we have on the distribution of local fallout comes from our weapons tests. However, because a reactor is not a bomb, the cloud of fission products would not rise to great heights and the area of contamination would be much smaller.

Access to land downwind will be limited for a period of time because of radiation levels from the fallout. The actual shape of these areas would be strongly dependent upon the methods of release and dispersion.

Estimated effects from contamination resulting from release of perhaps 1 percent of the accumulated fission products after 100 days operation at full power are about as follows: For a 10,000-kilowatt reactor, in an area of 1 to 5 square miles, crops would probably be unfit for use, within this same area perhaps one-half square mile would have to be temporarily evacuated, perhaps 50 to 100 acres would be unusable for about 2 years without thorough decontamination; and in addition, of course, there might be a few acres near the site which would be more heavily contaminated. For higher power reactors, these figures would be increased nearly proportionally. Of course, larger releases than 1 percent could conceivably occur though the probability or possibility of any release depends strongly on the reactor design and the type of containment.

These estimates are merely orders of magnitude and would be influenced by local conditions of terrain, wind patterns, and nature of the surfaces. Personnel contamination might also occur within these areas with the result that immediate decontamination would be necessary to prevent injury from the beta radiations.

Once the area has been contaminated, the intensity of radiation will decrease by two mechnisms: (1) by normal radioactive decay, and (2) by weathering and possible incorporation into the topsoil. Gamma dosage rates at several feet above the ground will decrease to the

[1] In a letter received June 13, 1956, the Commission stated that the reference by Dr. Libby to kilowatts meant thermal kilowatts. See p. 376 for copy of letter.

maximum permissible whole body dosage of 300 mr/week in about 5 years for an initial contamination of 5 millicuries per square foot of surface area; in about 2 years for an initial contamination of 2 millicuries per square area; and in about 1 year for the 0.5 millicurie per square-foot area. The specific times required will be dependent upon the weathering and upon the time of irradiation of the fuel elements.

Rainfall during the escape of fission products would change these estimates since the rate of local deposition would be increased and the areas immediately surrounding the plant would be subjected to much higher contamination levels. This, of course, would increase the probability of severe damage close in, but would decrease the damage farther out with a reduction of the total area involved.

Contamination of bodies of water could occur both by direct fallout and by secondary leaching of the materials from the land into the streams. Direct fallout could render bodies of water reasonably close to the reactor unfit for use until the material was carried away. However, leaching into the stream is slow enough to cause little trouble although monitoring downstream is advisable.

Let us consider the possibility of a radioactive cloud of fission products passing over a stream during a rainfall. Severe contamination could result depending upon the rate of rainfall and the streamflow characteristics. Of more concern, in at least some cases, is the possibility of the escape of reactor coolant containing a significant quantity of fission products. Such a mishap could result in a fairly large volume of contaminated water, depending again upon the flow characteristics of the stream. This could cause severe downstream contamination of water treating plants or other equipment.

WORST POSSIBLE DAMAGE ESTIMATES [2]

In estimating the maximum possible cost of a major reactor failure, one can assume the very unlikely total release of all the fission products instead of the possible 1 percent discussed above.

If one assumes (*a*) that property contaminated to the point where it would be unusable for more than 2 years (i. e., above 2 millicuries per square foot) would have to be retired from productive use and the owner compensated for the loss of his land at full market value, (*b*) that property contaminated to the point where it would be unusable for 2 years or less would require reimbursement to the extent of about 10 percent of the market value, and (*c*) that the first year's crops on slightly contaminated land would not be offered for sale and the owner would be reimbursed therefor, but not for subsequent crops on the same land, then using certain figures from the Census Bureau for the value of urban and rural land and crop together with the assumptions just given, we estimate a range of worst possible property damage as follows:

(*a*) For a 10,000-kilowatt reactor, from $5 to $24 million.

(*b*) For a 100,000-kilowatt reactor, from $50 to $200 million.

Larger reactors would involve the possibility of larger amounts of damage. This, I want to emphasize, is based on the worst possible case—explosive rupture of the core of the reactor and complete release

[2] In a letter received June 13, 1956, the Commission stated that the references by Dr. Libby to kilowatts meant thermal kilowatts. See p. 376 for copy of letter.

of all the accumulated fission products after 100 days of operation at full power.

Chairman ANDERSON. On that basis, Doctor, there would not be any point in talking about $5 billion total coverage, would there? A 100,000-kilowatt reactor only runs up to $200 million, and if we get some big ones they will only be 200,000 kilowatts, or at the most 300,000 kilowatts, so that there is no possibility of damage over a billion dollars, is there? Or $500 million?

Dr. LIBBY. These estimates, I am sure, are pretty conservative. But there is a chance they aren't. We are so uncertain about this. I think you are right, Senator. I think these are conservative estimates.

Chairman ANDERSON. Then why does the AEC feel that you cannot put a top limit on this? It has been suggested we put a top limit of $500 million in the protection that the Government might extend which would be on top of the $65 million, making a total coverage of $565 million.

Would that not be pretty complete coverage?

Dr. LIBBY. Though I speak with an air of certainty, I am not sure these figures are absolutely the upper limits to maximum possible loss. I think the assumptions given in calculating these figures are reasonable assumptions. But you might have conditions, Senator, which make them worse. I think that you see that.

Chairman ANDERSON. Have you examined any of these figures of people who have calculated that it might run to $5 billion?

Dr. LIBBY. I have not personally, sir; but I believe our staff has. I think we could get more enlightening testimony on that from someone else, if you wish it.

Dr. LIBBY. We have discussed the worst possible damage to property. Let us now turn our attention to worst possible effects on humans. This could be quite extensive. As an example, for full release from a 100,000-kilowatt reactor between 20 and 50 people could be killed in a region of population density of 200 to 500 people per square mile with perhaps 300 to 500 exposed to possibly damaging levels of radiation even with fairly prompt evacuation.

To give proper perspective to these data, one must reiterate that the probability of a major reactor failure, although currently indeterminate, is vanishingly small, and that the essential itnegrity of containment structure can probably be assured by conventional engineering design and construction.

Even containment systems which are less than perfect are high desirable. Looking at it pessimistically we might expect a release of 1 percent of the fission products in the event of a reactor failure. For a 100,000-kilowatt reactor such a failure would be equivalent to total release from a 1,000-kilowatt reactor. Such a release could result in damages of the order of only a few million dollars. Estimates of this magnitude are well within the range of experience in conventional industries.

Chairman ANDERSON. Doctor, if there could be a loss that might run $200 million, would you feel that when you got up to giving a license for a 100,000-kilowatt plant that you might require, as a preliminary to giving that license, that they advise you what their intentions are with reference to insurance?

Dr. LIBBY. I believe our plans were to keep the two things quite separate, but I will have to ask the general manager about that.

Mr. PRICE. Mr. Chairman, as I understand the question, it was whether or not the Commission, as a condition of issuing a license for a 100,000-kilowatt reactor, would inquire about the insurance plans of the licensee.

Chairman ANDERSON. Yes, sir.

Mr. PRICE. If I understand correctly, that is the same question we talked about this morning as to whether or not in issuing a license the Commission would require a showing of a minimum amount of resources to take care of public liability claims.

Chairman ANDERSON. Let us put it this way: You give a man a license to go out and operate a machine. You check on the safety of the planning put into it.

Mr. PRICE. That is right.

Chairman ANDERSON. You check up on the engineering and all the details that go into it, and then you give him a license to turn it loose, knowing that if it blows up or runs away or does something or other it could inflict $200 million damage and maybe more. And that has not taken into consideration any human life values, and they could double that.

Knowing that it could do all that, do you then give him a license to operate without saying, "Look, you have got to protect the public against the possibility that this may happen"? Do you allow him to go at it without any insurance if he wants to?

Mr. PRICE. Sir, at the present time he could not build a single plant if we told him he had to get insurance that is not available. That is why we are up here on this program.

Chairman ANDERSON. Exactly. But by the same token you repeated here this morning, or someone did, the fact that General Electric and Commonwealth had said they were not ready to proceed without insurance, the reinsurance problem being solved.

If they are not ready to proceed without it being solved, that is for the protection of their shareholders. But suppose somebody else comes along and builds one and he uses a corporate device and does not have any shareholders to worry about. He organizes some subsidiary company, and because it is a corporate form where the stockholders' liability cannot carry over to the individual owners of the stock, do you just say to them, "Well, as long as you work out some gadget so that you cannot hurt the stockholders of your parent company we don't mind if you do $500 million worth of damage and are not able to pay the public a penny. That is the public's lookout."

Do I understand that to be your attitude?

Mr. PRICE. No, sir; that is not our attitude.

Chairman ANDERSON. What is your attitude?

Mr. PRICE. Our attitude is that when we issue the license we will be satisfied that that facility meets all the requirements that we can think of to give assurance of safe operation and that we believe that it will be safe for the operator.

We have thought that it is a separate question as to whether or not——

Chairman ANDERSON. Stop there.

Do you think that your check into that is sufficient protection of the public?

Mr. PRICE. Sir, it is the check for the protection of the public that we have been given to operate under.

Chairman ANDERSON. If you think that is sufficient, then why do you ask for any insurance? Because that is just a dollar and cents question of protecting stockholders.

Mr. PRICE. The purpose of checking his design, his containments, his location, his operating procedure, his safety devices, all those matters, in the licensing process, the purpose of that is to protect the public, and that is the sole purpose of it. That is the whole objective of the licensing requirements of the act and the regulations.

Chairman ANDERSON. You must think that check is sufficient or you would not give him the license, would you?

Mr. PRICE. That is right. But the whole trouble is——

Chairman ANDERSON. If that is enough to protect the public, then why do we need any insurance other than what they are able to get themselves?

Mr. PRICE. Sir, for the reason that we cannot guarantee that that check will, for sure, avoid this accident.

Chairman ANDERSON. If you cannot guarantee it, then why do you not protect the public by requiring the insurance?

Mr. PRICE. I am not sure that in our minds the insurance needs and the safety requirements are in that way related.

Chairman ANDERSON. You realize, then, that this just ties in with testimony you gave this morning that you are not concerned with what happens to the public once you have given him the license. If anything happens and the fellow does not have insurance, that is just his own hard luck. But the shareholders of the company, since they have got their money in it, you must protect their money at all hazards.

Mr. PRICE. No, sir.

Chairman ANDERSON. That is the only thing I can get from your testimony.

Mr. PRICE. I am sorry I gave that impression, Senator.

The sole purpose of all the safety review under the licensing procedure is to protect the public.

Chairman ANDERSON. I understand that.

Mr. PRICE. And what I intended to say, and the reason that we are in here asking for indemnity or reinsurance authority is to be able to give the companies the protection that they say they have to have in order to go into this business.

Chairman ANDERSON. Exactly. That is what I was saying. When you get through with your inspection you are satisfied as far as the public is concerned. The only person that faces the question about insurance is the company that is going to build. And they are interested in protecting their stockholders.

Mr. PRICE. That is right.

Chairman ANDERSON. That is right.

Thank you.

Representative COLE. Is there not something more to it than just protecting the stockholders? Is it not in the interest of the operator to protect himself against bankruptcy which might result from a failure to meet the claims of the people sent into him?

I expect, of course, the loss to him could not be greater than the extent of his properties and the assets he might have available.

Mr. PRICE. Yes, sir. And I think the companies have more than the interest of protecting their existing assets in terms of a big loss. These companies have inevitably got to be in a position where, if those losses occur, they will be able to pay off.

Representative COLE. Do you conceive that at any time the Commission would grant a license to an applicant without being satisfied of the applicant's financial capacity by way of his own assets, or by way of insurance, to meet the reasonably anticipated damages that might be expected, or that the operation might expose him to?

Mr. PRICE. I think reasonably anticipated, I would agree with you. But I am not sure that as a condition of granting a license that the Commission ought to say to this man, assuming he has got a reactor that fits the size of this hypothetical example, that that man, in order to run that reactor, has got to buy either from private companies or from the Government a total of $200 million worth of insurance.

As Dr. Libby has testified, and all the rest of us, we think the risk and the possibility that all of the fission products in that kind of a reactor under those conditions are going to get out is almost zero. We cannot say it is zero, and in view of that I would not think that we would want to require that man, if he did not think he needed it for his own protection, to buy the full $200 million.

Now, so far as protecting the public, we will, for sure, give his license application a going over to satisfy ourselves in that respect, that it meets all the safety requirements.

Representative COLE. Do you mean to say, then, that the determination of whether an applicant has adequately protected himself against public claims is a determination to be made by the applicant himself?

Mr. PRICE. Under our proposed legislation, he would be allowed to buy as much indemnity protection as he wanted to pay for, yes, sir.

Representative COLE. Suppose he said, "I don't want any protection"? Suppose he said, "I don't want any insurance"? And he is without any assets?

Mr. PRICE. I am not sure if he hasn't got any assets or insurance we would be granting him a license.

Representative COLE. Would the Commission require the applicant to satisfy the Commission that the applicant had sufficient protection either by way of assets or by way of insurance to meet the reasonably anticipated damages that might flow from it?

Mr. PRICE. All I can answer to that, Mr. Cole, is that up to now the Commission has decided that before an applicant will be allowed to go forward he will have to make two showings in connection with his financial responsibility: one, his ability to pay the Commission for the use of the material, and to pay the Commission for the value of material lost or burned; and second, financial ability to carry forward the project.

The Commission has reserved, has pending, and has not yet decided on what should be its attitude with respect to how much resources in addition to that the company should show for the purpose of meeting the claims of third parties against damages from accidents. So that is where we stand on that.

Representative COLE. When are you going to reach your decision?

Mr. PRICE. It is a decision that ought to be reached——

Representative COLE. What are the imponderables?

Mr. PRICE. I don't know that there are any imponderables. We started out at the beginning of the year when we issued the regulations reserving on that question because we just had not thought through this insurance problem. We were not sure what the relationship was. We did not act on that question.

Sure, the Commission will have to do it in the fairly near future, but I am sure we are not talking about a requirement that he show either insurance or other assets to cover what somebody might decide, under a special set of assumptions, was a maximum conceivable damage, because we don't expect that to happen.

Representative COLE. I cannot conceive that the Commission would be justified in granting a license unless the Commission was satisfied that the public interest was protected, either by way of adequate insurance or by way of assets the applicant may have.

Mr. PRICE. I think that is right for some reasonably——

Representative COLE. Why is it not a policy of the Commission to say so?

Chairman ANDERSON. That is a question I have been raising. You take the workmen's compensation law. It is enacted solely to give the workman a paying compensation. You want to be sure that if a man is injured and has a large claim, and the protection of his family is therefore jeopardized, that the employer is not going to say, "Well, I am broke. You fall back on the public."

Now, if you have got plenty of assets you can sometimes go into court and become a self-insurer, but you have to persuade the court that you are going to have plenty of assets and they are going to be available.

Mr. PRICE. The resolution of this question has not become urgent for the simple reason that all these companies have said they just cannot go ahead without taking a position that even $65 million is not going to be enough. I mean, with that attitude, the cases we have are all talking about insurance and resources way ahead of what I would think that the Commission would impose as a minimum requirement to take care of normal expectancies.

Representative COLE. Is it so evident that the applicants are going to provide this protection to the property——

Mr. PRICE. Over and above what the Commission would impose.

Representative COLE. That it is not going to be necesary for the Commission to require it?

Mr. PRICE. No. I think the Commission will go ahead and adopt a policy on the questions you have raised. All I am saying at the moment is that it is no problem because the companies are talking about wanting resources way above any figure that I would think the Commission would impose as a minimum.

They are saying that even $65 million is not enough and that other figures are not enough.

Chairman ANDERSON. I think you might be surprised when the Nebraska group testifies, because I am not sure that they have been able to get a firm commitment from anybody to carry their insurance thus far.

Cooperatives, if they are true cooperatives, pass their earnings back in dividends and it leaves them with no imposing capital structure. The only way they can protect the public is through insurance.

Mr. PRICE. That is right. Of course, they have not applied yet for a license. They are still negotiating for their contractual arrangements and financial arrangements.

Chairman ANDERSON. There we come. If we are going to try to run the program for Consolidated Edison and Commonwealth Edison and Detroit Edison to build plants and do not want to get small plants in it, then, of course, you are operating on the right theory.

If you are talking about keeping them out——

Mr. PRICE. I did not mean they would be kept out of this.

Chairman ANDERSON. That would keep them effectively out. If they cannot get insurance it is just too bad. You say, "I am sorry, but you are a small REA or public power district. You join up with the Consolidated Edison or Commonwealth Edison or Detroit Edison and we will talk to you."

Mr. PRICE. They want to buy insurance as far as I know, and we are trying to get in a position to offer them the protection above what the private companies can offer them. They don't want to run that plant without adequate insurance.

Chairman ANDERSON. You are trying to offer it to them at a $65 million level or above. And if they only want $5 million you want a $60 million gap in there, with no protection to anybody.

Mr. PRICE. I don't know whether they just want $5 million. If that is all they want——

Chairman ANDERSON. Then what happens? You tell us what happens under your bill if that is all they want.

Mr. PRICE. Even if the Commission decided——

Chairman ANDERSON. No. Under your bill what happens? Not if the committee decides. Just in your bill.

Mr. PRICE. I was going to address myself to both questions.

If that is all they want, under this bill that is all they would buy, I suppose, unless they decided we will buy $5 million and then skip to $65 million. I don't know whether they can buy from the Government from there on. I don't know whether they can do that or not.

Chairman ANDERSON. That is all they would buy. And everything above that would be uninsured?

Mr. PRICE. That is right, unless on the question that Mr. Cole raised the Commission decided that $5 million just was not enough to let them have a license.

Representative COLE. That would be quite in keeping with the philosophy of the act, which is to place the Government in a position to assist the operator to meet his liability.

Now, if he is not liable, because of the nature of his structure or his legal status, then I do not see any reason why the Federal Government should have a liability greater than the liability of the operator himself.

So, if it is a case of a cooperative which, because of its legal nature, has no liability in terms of assets, or a hospital which has no liability at all or a school or college, then I find it difficult to persuade myself that the Federal Government should have a greater liability in protecting the public than the operator himself.

Chairman ANDERSON. That is the very point that I raised a minute ago: $200 million property damage is done just the same and you say to the people that are damaged $200 million worth, "We are sorry, but they only had $5 million worth of insurance. The other $195 million

you can just whistle for. And as far as the 50 million people who died, we have no interest in them whatever."

That is why I say I think maybe you had better take a look at the possibility of requiring them to carry something to protect the general public.

Do you allow a bus company to operate, bad as it may operate in the District of Columbia, without something to pay off a person if they hit him?

Mr. PRICE. No, sir, but I doubt that you assure that they have got enough to pay off on the maximum credible possibility.

Chairman ANDERSON. You require them to have enough to carry the maximum liability that you think they are possibly going to incur. And it would be larger in a community of this size than it would be in a tiny one.

Well, I do hope we take another look at this from the standpoint of the protection of the public as well as the protection of the stockholders.

Dr. LIBBY. Our next witness, sir, is the general manager.

Mr. FIELDS. I present the Commission's organization and procedures for handling atomic energy hazards.

Chairman ANDERSON. Excuse me. I do hope that when we get through with some of these individual papers you might say, "And now I will relate this to the problem of insurance."

I would like to have had Dr. Libby, when he got through, say, "This is what this means in terms of insurance." I hope you will give us something on what it means in terms of insurance. I know what you are doing—I will not say I know, but when you get through with your paper I will know what you are doing toward protecting the health and safety of the public. But relate that to the insurance problem we have before us when you finish, if you please.

Mr. FIELDS. Yes, sir.

The Atomic Energy Act of 1954 gives to the Commission the responsibility of protecting the health and safety of the public with regard to the processing and use of atomic materials.

In developing the regulatory program to discharge this responsibility, it is necessary for the Commission to prepare standards, guides and codes against which proposed design and operating procedures may be evaluated for their adequacy in preventing accidents and in minimizing the effects of those which may occur.

Completely useful standards or codes can only be developed as the facilities themselves become somewhat standardized. At the present time, such is not the case. Each proposed reactor is different in its major aspects from all other reactors and it is possible now to develop only very general standards and guides for reactor safety.

Consequently, it has been necessary to develop a system of hazard evaluation of individual reactors which is unique in industrial history. Under this system, before any reactor, regardless of its size or intended use, is licensed for operation, the Commission must, on the basis of detailed study and evaluation of the design specifications and operating procedures and conditions, determine that there is reasonable assurance that such operation will not endanger the health and safety of the public.

Because of the complexity of the problem, the initial detailed hazard study and evaluation can only be made by the scientists and engineers

who are thoroughly familiar with the specific reactor design under consideration, and they must exercise the same precise concern on this that they do on the design itself.

This hazard evaluation requires a complete study of all aspects of the reactor and its operation to determine, on the basis of the best available information what can possibly go wrong and what steps can be taken to prevent such an occurrence.

First, the engineers and scientists critically review every phase of the reactor design and operating procedure in itself and in its relationship to the integrated whole. They carefully consider the inherent nuclear, chemical, metallurgical, physical, and mechanical characteristics of the fuel, the moderator, the coolant, the neutron absorbers and structural materials, in relation to the similar characteristics of the control and safety systems, the heat removal system, the pressure systems, and so forth, to assure that the probability of a serious operaing mishap has been brought to an acceptably low level.

This review and evaluation of the design and proposed operating procedures is concerned with determining that reasonable steps have been taken to prevent escape of radioactive fission products from the reactor core. However, it must be recognized that in spite of all precautions the most unlikely series of events might take place—and, therefore, the designers must consider that an accident could occur which would result in the release of fission products from the reactor core.

Chairman ANDERSON. You used the words "accident could occur." Your text reads "incident."

Are you satisfied with the word "incident"?

Mr. FIELDS. "Incident" is correct.

They must then determine what second line of defense they should contrive to minimize the consequences of even highly unlikely accidents.

This says accident. The above is an incident, which is probably also an accident in this case.

Senator JACKSON. It is still the same problem.

Mr. FIELDS. It is still the same problem.

In making this determination, they must consider where to locate the reactor with respect to centers of population, and what type of safety structure should be used to contain the reactor. This means that a reactor owner must select his site on the basis of complete knowledge of pertinent radiological safety factors. He must consider the hydrology, meteorology and seismology of his alternate sites; he must look at the population density of the surrounding areas and attempt to foresee the probable population distribution in future years; he must determine whether the surrounding areas are used or will be used for industrial, commercial, agricultural, or residential purposes, or are not likely to attract human habitation; and he must know whether the surface or ground waters that might be subject to contamination by his reactor are used for human or animal consumption.

As I have pointed out, the full responsibility for making the initial detailed hazard study and evaluation rests with the scientists and engineers who are designing the reactor.

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Based on this study and evaluation, they prepare and submit to the Commission, as a part of their application for a license, a report which we call a hazard summary report.

This document presents the applicant's findings with regard to (1) his best technical opinion as to what events could possibly take place in his reactor which could result in the release of radioactive materials from its core; (2) his judgment concerning the adequacy of the counter measures which he has taken, either by design or operating procedure, to minimize the probability of these events occurring; and (3) his conclusions concerning the effectiveness of his containment and isolation in minimizing the effects of such events should they occur.

In the ideal situation, where all hazard information is available prior to application for a license, following the submission of the hazard summary report, the technical experts on the staff of our Division of Civilian Application can make a complete and detailed review of the overall hazard problem, obtain such advice as is needed from the Advisory Committee on Reactor Safeguards and other technical people both on and off the Commission staff, and furnish the technical judgment on the question of whether there is reasonable assurance that operation of the reactor in question will not endanger the health and safety of the public.

This judgment, together with other findings on certain matters not involving hazard considerations, can then be used by the Director of the Division of Civilian Application to make the determinations that are needed to issue a construction permit for the facility. Under these ideal conditions, the licensee can then construct his reactor in accordance with the conditions of his construction permit and having done so obtain a license to operate his facility.

Such ideal conditions, of course, do not exist today. In this era of experimentation and development, the same factors which make it impossible for us to prepare standards and codes, also, with few exceptions, make it essentially impossible for the reactor designer to submit a complete hazard summary report at an early stage in his planning. Adequate hazard evaluation, as has been indicated, can be made only on the basis of detailed and exact design specifications and operating procedures. The power reactors that are being considered today are still being developed. Experimental programs and theoretical studies, the results of which may cause extensive design changes, are still being carried out, and will continue to be carried out for extended periods of time.

We recognized this state of affairs in our regulations and made provisions under which we could issue provisional construction permits prior to the time when we had all of the technical information needed to issue one with no conditions. We have established procedures whereby the applicant may submit the results of his hazard evaluation step by step as a series of preliminary hazard summary reports. At such a time as we are satisfied that we have information sufficient to provide reasonable assurance that a facility of the general type proposed can be constructed and operated at a proposed location without undue risk to the health and safety of the public, we can issue a construction permit for the facility. Such a permit is, of course, conditional and will not convert to a license to operate until the complete hazard summary report has been submitted, and we have made a finding based thereon that the final design of the specific facility provides reasonable

assurance that the health and safety of the public will not be endangered by operation of the reactor in accordance with specified procedures.

This is the type of construction permit that we will probably have to issue for all of the power demonstration reactors, and even for many of the research, testing, and medical reactors, for the next few years.

Chairman ANDERSON. Who submits this hazard report? The man who is going to operate the reactor or the man that is going to build the reactor?

Mr. FIELDS. It is submitted normally by the man who is going to operate the reactor. But it is usually prepared for him, in large part, by the man who is going to build it. They are both involved.

Chairman ANDERSON. Let us take Commonwealth Edison, since it is going to be 45 miles southwest of Chicago. Who would submit it there? General Electric, that is going to design most of it, or Bechtel, that is going to do the engineering and construction, maybe, or Commonwealth Edison, that is going to operate it?

Mr. FIELDS. Can you answer that?

Mr. PRICE. Senator, we would not have any preference as to who submitted it, so long as we were satisfied, our technical people were satisfied with the sufficiency and adequacy of the report.

As General Fields says, in a situation like this normally these technical matters are prepared by the designer of the reactor, and in this case I believe it would be the General Electric people.

Chairman ANDERSON. Who is responsible for getting it in?

Mr. PRICE. The Commonwealth Edison Co., who applied for the construction permit.

Chairman ANDERSON. Fundamentally it must be their report?

Mr. PRICE. They are bound by it, because they are the people that we will look to for the safe operation of that reactor.

Chairman ANDERSON. Now that I have got you stopped, on page 4 you referred to technical experts, in the third paragraph, the third line. You said:

> Following the submission of the hazard summary report, the technical experts * * *

I have always been wondering what is the difference between an expert and a technical expert.

Mr. FIELDS. That is a good question.

Shall I finish?

Chairman ANDERSON. Go ahead.

Mr. FIELDS. Such a permit—that is, a conditional construction permit—is of value to the applicant in that it gives him assurance that any construction activity that he may desire to carry out will not be in violation of the law. It also tells him, in most cases, that his technical and financial qualifications meet the required standards, that the license which he will receive upon satisfactory completion of his facility will be class 104, and that the period for which he will be licensed to operate has been determined. In addition, it gives him assurance that sufficient fuel will be made available for operation of his reactor for the period of his license.

From the hazard standpoint, the issuance of a conditional construction permit means that based on existing information it is our opinion that it will be possible for the designers of the reactor to resolve any

existing design and operational uncertainties in such a way that when the final design and operating procedures of the reactor, including its containment, are evaluated, they will be found to offer no unacceptable hazards.

Since the final design has not been determined and the final evaluation of actual design and operating procedures at the time the permit is issued, it is clear that, as the program progresses, as more calculations are made, as more information is gathered and as more experiments are carried out, if it should develop that a reactor of the type under consideration is shown to be unsuitable for operation on the chosen site, or for that matter on any site, we, of course, could not convert the permit to a license to operate. The issuance of the permit does, however, make it clear that any additional information about the site will not in itself have any bearing on the conversion of the permit to a license.

Independently of, and in addition to, the Commission's hazard evaluation program and procedure which I have described and which is the heart of the licensing program, the Commission has an inspection program. The inspection of reactors and other licensed activities is the responsibility of the Commission's Division of Inspection. The Commission then is in a position of assuring, as far as possible, safe operation of ractors not only through its predetermination of potential hazards and the issuance of licenses having provisions and standards to minimize such hazards, but also through direct firsthand inspection of the construction and operation of such facilities.

The Division of Inspection is responsible to me primarily for inspecting holders of construction permits and licenses for compliance with the rules and regulations of the Commission, and the conditions of the permit or license, and reporting the results thereof so that licenses may be modified, terminated or suspended as warranted by the evaluation of the findings.

In summary and conclusion, may I say that the philosophy which the Commission follows in discharging its responsibility to protect the public from the potential hazards of a nuclear industry is based on the assumption that this hazard, while in no way comparable to that of an atomic explosion, is nevertheless greater than that which can result from nonnuclear industrial activities, and that the ultimate safety of the public is dependent upon a program which:

1. Makes an extremely careful and detailed evaluation of every nuclear reactor to assure that all possible hazards have been recognized and defined;

2. Assures that all reasonable steps are taken to minimize the probability of the occurrance of an accident;

3. Assures, through adequate combination of containment and isolation, that even if an accident does occur its consequences will be minimal;

4. Relies heavily on the technical competence of the designers and operators of the reactor and of those making the hazard evaluation, and on the administrative and management abilities of the organizations which will operate the reactors;

5. Continually checks on the activities of the reactor operator for compliance with the rules and regulations of the Commission and the conditions of the license.

Chairman ANDERSON. Now, Mr. Price said earlier that you would comment on this question I raised as to setting up a formal or informal safety standard on the location of the reactors, construction, and the operation. Are these going to be published? Is there anything further than the informal statement that you have made that you require that this survey shall be conducted and a report made to the Commission?

Mr. FIELDS. At such time as we have codes and standards they would definitely by published. We do not at this preliminary point feel we are in a position to issue standards. We can issue general criteria.

Perhaps Mr. Price would like to elaborate on this.

Mr. PRICE. The procedures and the requirements which Mr. Fields has covered are already published in our licensing regulations.

What we are talking about when we say we would like to ultimately develop some specific standards and guides is that we would like to be more specific than this, to be able, in effect, to give the applicant a sort of a boiler code, or as near as we can come to it in advance, so he knows exactly what requirements in terms of specifications and other technical requirements he will have to meet.

This is a problem that we will have to approach gradually and we cannot really reach our objective in it until, as Mr. Fields has said, we have gotten to the point of some standardization in this field.

Right now each reactor is a totally separate problem from the safety standpoint. They are all based on different design concepts. And we will have to look at them under these kinds of procedures and rules on a case-by-case basis.

Take, for example, location. We don't say that a reactor has got to be located according to some specific rules. As I say, each is different. We look at the location in combination with containment. A particular location we might find was all right with twice as much containment as would be necessary, perhaps, in a more isolated location.

We don't want to freeze any technical requirements here at this stage. We think that the risk of being wrong is too great to justify freezing some specific requirements in this field.

Chairman ANDERSON. This is sort of a general question, General Fields. But listening to Dr. McCullough's statement on reactor hazards and reactor safeguards, and then listening to Dr. Libby on the maximum that might happen and therefore concluding what the ordinary might be that you would ordinarily insure against, and hearing you tell how carefully you select the site and take each step, does it not sort of leave the impression that maybe we do not need any extra insurance and that enough safeguards are being taken and the possibility of hazard is not so great but what we could get by with $65 million pretty well?

Mr. FIELDS. I think the burden of what I have tried to say here in the procedure is to show just that we are going to do everything that we can to insure that anything that happened would be the very minimum.

Chairman ANDERSON. I think it is a very good statement. I think it does show that.

Mr. FIELDS. The only thing we cannot be sure of is perhaps the unknown. Anything we know about we intend, by this procedure, to take the necessary precautions that the damage that could result from an accident will be minimal.

There might be some unknown surprises. These we do not know whether we can take care of them, not knowing them.

Chairman ANDERSON. They brought the *Nautilus* into New York a day or two ago, right into an area where several hundred million dollars' worth of property damage could be done. Obviously the Government was not very worried about it. It came and left and no damage resulted.

Mr. FIELDS. We have had a fair amount of experience with that, quite a few hours of operation, as you know.

Chairman ANDERSON. Yes. But you do have quite a few thousand hours of operation of reactors inside the experience of the Atomic Energy Commission.

Mr. FIELDS. That is true, too.

Chairman ANDERSON. What bothers some of us, and what bothers me a bit, General Fields, is that when we had our meeting on plans for construction about a year or so ago there was an absolute line of about $300 million worth of reactors that were coming along here. We had that again later.

Then all of a sudden we began to hear that unless this insurance problem was solved nobody was going to do anything.

Consolidated, I must admit, did not say that. I think Mr. Searing will say he is going right ahead whether you solve the insurance problem or whether you do not. It is a little confusing as to why Mr. Searing, with a very big plant, feels it absolutely safe to go ahead. Others with somewhat similar operations feel the insurance problem has to be settled.

And then we have a third group like Detroit Edison that must solve the insurance problem, the antiholding problem, the income-tax situation, and they have a half dozen other things before they can go ahead.

Does the Commission feel that anything more than the insurance problem needs to be settled?

Mr. FIELDS. Anything more than the insurance problem?

Chairman ANDERSON. Anything more than the insurance problem. If the insurance problem is settled—and I assume you feel it should be settled because you have made a recommendation on that.

Mr. FIELDS. We made a recommendation on that.

Chairman ANDERSON. So you must feel that that needs to be settled.

Mr. FIELDS. Yes. We think that the insurance problem does need some solution.

Chairman ANDERSON. Yes, obviously; because you have a bill.

Mr. FIELDS. Obviously.

Chairman ANDERSON. And you would not do that if you did not feel that.

Mr. FIELDS. On the other problems there is some indication from some of the companies, as you indicate. There is the problem of the Holding Company Act that seems to be of concern to them.

Chairman ANDERSON. Does the Commission feel that is a problem?

Mr. FIELDS. We recognize that it is a problem, apparently, for some of them, and we have testified in favor of a bill which is being considered——

Chairman ANDERSON. In the Banking and Currency Committee?

Mr. FIELDS. By the Interstate and Foreign Commerce Committee. We have testified there on a bill with certain recommendations with respect to it.

Insofar as relief on taxes is concerned, at the moment our information is to the effect that there apparently is no problem.

Chairman ANDERSON. There is just to the same degree that there is a problem on the rest of these things, because you are familiar with Walker Cisler's testimony. He wants to build the reactor with profits from their company and have those contributions that he makes be charged as expense.

Mr. FIELDS. I perhaps should not say a problem. I should say at this stage I understand he has made an application which has perhaps not been processed completely. And I don't know the present stage of it.

Mr. PRICE. He has an application pending with the Internal Revenue Service for a ruling on the question. That is the status of it.

Representative COLE. I do not understand the basis of his application. Could you explain it?

Mr. PRICE. Only in broad outline, because I am not familiar with the details of it at all. But it is my understanding that the company is seeking a ruling under existing law. So far as I know, no special legislation is involved.

The company is seeking a ruling on the question of whether or not the contributions to that project by the participating companies will be exempt from taxation under the income-tax laws. And, of course, they hope to get it.

Representative COLE. No tax contributions?

Mr. PRICE. But, you see, there are a number of companies that are making financial contributions to the capital cost of the plant. What they are asking is that those contributions be allowable as deductions in the same way that opearting expenses are.

Chairman ANDERSON. Is it not true that they are asking that the amounts of money in capital expenditures turned into this reactor be regarded as expense?

Mr. PRICE. That is right. Research expenditures, I believe, is the way they put it.

Senator GORE. To put it another way, they want them treated as charity contributions.

Mr. PRICE. No. It is my understanding that they are asking that they be regarded as research expenditures which, to my understanding, are deductible.

I do not know what the ruling would be. It is just that it is pending now.

As far as I know, this is not a question of special relief. Either they qualify or they don't.

Representative COLE. There is not any change in the law?

Mr. PRICE. As far as I know there is not. Either they qualify under existing law or they don't.

Senator GORE. Do you know if they make the obtaining of this ruling or concession as a condition precedent to their going forward with this production?

Mr. PRICE. I believe, Senator Gore, they have made that condition. So far as I am aware, they are the only one of the companies involved that have made that a condition.

Chairman ANDERSON. I think probably I was going backward. I think probably I should have said that the maximum that we know is the question of this research being chargeable as an expense.

Is that, so far as you know, the only one in process thus far?

Mr. PRICE. I am not sure, but they haven't made it a condition of going ahead.

Chairman ANDERSON. But other companies have asked that they be exempted from the holding company angle and that may be confined to two groups. Most people, then, you think, are interested in this insurance question?

Mr. PRICE. That is right.

To the extent that the people in the business have talked to us and to the extent that we understand they have testified here, by and large all of the utilities companies that are proposing to enter the program, and the manufacturers, have said that the resolution of the insurance problem is important and if it isn't resolved they would have to take another look at their participation.

It is true, as you said, the Consolidated Edison Co. has taken a different position.

Chairman ANDERSON. I only repeat, gentlemen—I don't ask you to comment on it—that after you hear how carefully the Atomic Energy Commission is going into this and how many precautions it has taken to safeguard health, to have an estimate as to what the order of magnitude in claims might be, you sort of wonder why the insurance program is necessary.

On the other hand, if the hazard isn't very great, it may be something that the Government might undertake without jeopardizing its credit too much.

Senator JACKSON. Mr. Chairman, the only thing is if you do have that one accident. I mean, the probability is less of an accident occurring in this area due to the very fine work that has been done over the years by the Commission and its contractors. It is an excellent record.

I am just reading through the part I missed this morning of Dr. McCullough. It is an excellent record. However, the important thing is not how many accidents occur, but the total damages that are going to have to be met by someone, and if you do have an accident, the damages that are going to have to be faced up to will be by one company, rather than a series of accidents spread over and paid out by a series of companies.

Isn't that it?

Chairman ANDERSON. Yes.

Senator JACKSON. It is a different situation. You can't assume that because the chance of an accident is less here that the total damages will not be greater.

Chairman ANDERSON. Yes, but Dr. Libby pointed out that the liability may not run into the billions of dollars. It might be more likely

to run into the hundreds of millions of dollars and possibly for the average contractor into a rather low category of claims.

Senator JACKSON. But if the one fellow has that accident, though.

Chairman ANDERSON. He is visualizing an accident. To me it seems, if Dr. Libby's estimate is correct—I mean I recognize it is just a statement; I am not trying to pin you down, Doctor—if it is correct and it is a rather small amount of money and so forth, then, of course, there would not be so much danger to the Government underwriting it beyond $65 million.

Senator JACKSON. If that assumption is correct.

Mr. PRICE. We think the risk is that kind of remoteness and that is the basis of our presentation. The difficulty is, as Senator Jackson says, with all of our safety requirements and our record, we can't guarantee against that one that might happen.

Chairman ANDERSON. Congressman Cole?

Representative COLE. Mr. Chairman, your reference to the nonchalant manner in which the *Nautilus* moved into New York Harbor, carrying terrific destruction, and yet nobody got unduly worked up about it, prompts me to make this inquiry. I guess maybe Dr. Libby should be the one to answer.

Do you anticipate the time will ever come, at least within the foreseeable future, when the Commission will be called upon to grant licenses to operate a reactor of a capacity equal to reactors which the Government is now operating?

Dr. LIBBY. I wouldn't be surprised if it happened. If atomic power proves to be economic, very large reactors might in some cases be proposed. I think it is a possibility, Mr. Cole.

Representative COLE. In the foreseeable future? Within the next 10 years?

Dr. LIBBY. That is a little difficult.

Representative COLE. Do you think any company or private capital is going to come in and build a reactor comparable to the reactors of the Government?

Dr. LIBBY. I am a little bit at a loss here, Mr. Cole, because there is classified information involved in replying to your question. I would be pleased to give it to you, of course, privately.

Representative COLE. I don't see where there is anything classified in speculating on the future with respect, in your opinion, to whether any private investor is going to pile up as many dollars as Uncle Sam has piled up in building reactors.

Dr. LIBBY. We spoke of reactors this morning.

Representatice COLE. I am talking about what we have. That would be classified, of course. I am not asking for that.

Dr. LIBBY. Suppose we take a factor of five.

Representative COLE. Never mind, if it is going to involve so much difficulty.

Dr. LIBBY. I think the very large machines might be built, yes. It depends on how well these work out.

Representative COLE. Tell me, if you can, without too much difficulty and violation of secrecy, how much damages has the Commission paid for the operation of all of its reactors since the beginning of the Manhattan Project?

Dr. LIBBY. I think the answer is zero.

Representative COLE. No; it isn't zero.

Dr. LIBBY. Mr. Fields, have we had any damages?

Mr. FIELDS. It is negligible, but are you referring to third-party liability from reactor accidents?

Representative COLE. Call it anything you want. We will start out with third-party liability.

Mr. FIELDS. I can't give you the answer now, but I am under the impression it is zero from reactor accidents as to third-party liability.

Mr. PRICE. That is right.

Chairman ANDERSON. I was going to say isn't it zero as far as third parties are concerned, and a very negligible amount as far as what we might call workmen's compensation is concerned?

Representative COLE. That is correct. What would you call paying for animals as a result of fallout tests?

Mr. FIELDS. I said with respect to reactor accidents.

Representative COLE. You said with respect to third-party liability. My question was with regard to reactors. That is even better yet. We have been operating with tremendous reactors and it is in my opinion in the near future there will be private capital petitioning to build reactors of comparable size.

We have the experience of maybe 12 or 14 years and we haven't paid out a single cent for public liability. While the risk is there, and it is conceivably so large, I am afraid it is a mote in our eyes; it isn't nearly as bad as imagination allows it to be painted to be, and experience verifies that.

Chairman ANDERSON. Don't you think, Congressman Cole, also, that it is important to point out that that very fine record has been made while we have been working with experimental reactors?

Now they have proven types and the hazard is that much less. I am not trying to say that insurance finally may not be necessary or may not be desirable.

Representative COLE. I am almost persuaded, as I have been sitting here cogitating this matter, to put the Government in the insurance business itself and say, "We'll pick up the ticket no matter what it is. We will charge each operator some nominal amount." But I don't think the insurance companies would like that.

Chairman ANDERSON. Mr. Mitchell?

Dr. LIBBY. Mr. Mitchell is our last witness, sir.

Mr. MITCHELL. Mr. Chairman, my first statement which has to do with the legal basis for liability is, even in my mind as a lawyer, rather dry. I suggest, perhaps, I just place it in the record and summarize it briefly, if that is satisfactory.

Chairman ANDERSON. I wish you would do that.

(The statement referred to follows:)

IV. LEGAL BASIS FOR LIABILITY

By William Mitchell, General Counsel

There has been considerable discussion, particularly among lawyers, concerning the matter of civil liability for radiation damage and much speculation concerning the liability rules which will apply in the event of an atomic accident. It is reasonable to assume that the utilization of atomic energy will raise unique problems but it is difficult to conceive of any which cannot be resolved within the framework of existing legal systems. It is equally difficult to assume the answers, and the principles of legal responsibility which will prevail must await the facts and practicalities of particular cases. There are, however, certain precedents in the law which by way of analogy indicate future issues which may arise.

DOCTRINE OF STRICT LIABILITY

The doctrine of strict liability for dangerous substances and activities is a comparatively recent development in the law. The word "dangerous" is a term with an infinite variety of meanings and, therefore, it must be defined and limited rather closely. Most things are sources of danger if they are used negligently. For example, motor vehicles kill thousands of people every year, and yet, if they are operated carefully, they are comparatively safe. On the other hand, there are certain things, such as dynamite, electricity, and gas, and certain activities such as blasting, which will involve a risk of serious harm in spite of all possible care. It is in such areas that strict liability has been applied. They have been called ultrahazardous or inherently dangerous activities. The leading case, from which the modern doctrine is defined, is *Rylands* v. *Fletcher*,[1] decided in England in 1868. The facts in this case briefly stated are as follows: Defendants constructed a reservoir upon their land and upon the site chosen for the purpose there was a disused and filled-up shaft of an abandoned coal mine, the passages of which connected with the adjoining mine of the plaintiff. Through the negligence of the independent contractors by whom the work was done, this fact was not discovered, and no precautions were taken. When the reservoir was filled, the water broke through into the shaft, and thence into the plaintiff's mine, which it flooded. Justice Blackburn in the English Court of Exchequer, in finding for the plaintiff, used the following language which has been much quoted since:

"We think that the true rule of law is that the person who for his own purposes brings on his lands and collects and keeps there anything likely to do mischief if it escapes must keep it at his peril and if he does not do so is prima facie answerable for all the damage which is the natural consequence of its escape."

In the House of Lords, Lord Cairns limited the use of the rule to situations involving a "nonnatural use of the land" which doctrine is incorporated in the Restatement of the Law of Torts. Section 519 thereof provides that—

"* * * one who carries on an ultrahazardous activity is liable to another whose person, land or chattels the actor should recognize as likely to be harmed by the unpreventable miscarriage of the activity for harm resulting thereto from that which makes the activity ultrahazardous although the utmost care is exercised to prevent the harm."

This concept of strict liability has been applied to the storage of explosives, to blasting, and to ground damage from aviation. Its extension to damage from radiation caused by escaping fission products in those states which accept the doctrine would seem to be consistent with the generalized rule of ultrahazardous activities.

It is, however, far from clear that one could support a general statement that strict liability will be applied in all cases of atomic accidents. Much will depend on technological developments and on prevailing social values, particularly where the operation involved is for the benefit of the public generally and is essential to the good of the state as a community. There are furthermore certain minor defenses which might succeed—the fault of the plaintiff, intervention by a third party, acts of God, normal or ordinary use of the land and statutory authority. The English courts themselves have excluded absolute liability where the activity in question was "merely * * * the ordinary use of the land or such a use as is proper for the general benefit of the community,[2] and it has been indicated that the manufacturer of explosives in wartime may be an "ordinary user." [3] Legislative permission to conduct an activity has the same effect as a "natural user." In this connection the rule of strict liability has been held inapplicable to a utility company whose gas escaped into a basement and exploded on the ground the company located and used its pipes in accordance with statutory permission.[4]

The presence of the Federal Government as a party to any litigation due to the ownership of the reactor fuel will raise additional questions relating to (*a*) the scope of the Federal Government's liability (compare sec. 2 (1) (c) of the British Crown Proceedings Act (10–11 Geo. 6, ch. 44), which imposes governmental liability absolutely by reason of the ownership or control of an extrahazardous

[1] L. R. 3 H. L. 330 (1868).
[2] *Richard* v. *Lothian*, 1913, A. C. 263 (P. C.).
[3] *Read* v. *Lyons*, 1945, K. B. 216, 240 (C. A. 1944).
[4] *Northwestern Utilities, Ltd.* v. *London Guarantee & Accident Co.*, 1936, A. C. 108, 105 L. J. P. C. 18.

instrumentality, with sec 410 (a) of the United States Federal Tort Claims Act, which requires a "negligent or wrongful act or omission" of a Government employee) and (*b*) liability for discretionary acts. (See *Dalehite* v. *United States*,[5] relieving the United States Government from liability in connection with the Texas City disaster by reason of the discretion and policy decisions involved in the Government's ammonium nitrate fertilizer program.)

RES IPSA LOQUITUR

There is another theory under which liability without fault may be imposed on the owner or operator of a nuclear reactor—that of res ipsa loquitur. This doctrine enunicated in England in 1863 in the case of *Byrne* v. *Boadle*,[6] involving a barrel of flour which rolled out of a warehouse window and fell upon a passing pedestrian, has been succinctly restated by Chief Justice Erle as follows:

"There must be reasonable evidence of negligence. But where the thing is shown to be under the management of the defendant or his servants and the accident is such as in the ordinary course of things does not happen if those who have the management used proper care, it affords reasonable evidence, in the absence of explanation by the defendants, that the accident arose from want of care."[7]

Basically this doctrine (which applies when the cause of the injury or damage is under the sole control of a defendant and experience indicates that the accident causing the harm will not happen if due care is exercised) permits the drawing of inferences of negligence from a mere recitation of the occurrence. It has been applied to a variety of circumstances—an unexplained explosion in a powder factory, boiler explosions, unexplained airplane accidents, bursting bottles, falling ceilings—and it is quite likely that an argument will be made for application in a case involving a reactor incident. The following language from an opinion in the Minnesota courts in a boiler case indicates the approach which may be taken:

"Boilers sometimes explode. Comparing the number of explosions with the extent of the use of boilers, explosions are not frequent. If they are kept in proper condition and repair, and if they are operated properly, explosions are unusual. Whether the res ipsa doctrine, which permits an inference of negligence from the fact of an explosion, should apply is largely a question of how justice in such cases is cost practically and fairly administered. There is nothing illegally illogical in permitting the inference to be drawn. Usually the party injured is without information upon which he may with certainty allege the exact cause, and is without direct proof. Perhaps the exact cause is incapable of ascertainment. The actual proof, if any, is with the party having the management of the instrumentality. These are practical considerations. We think the jury should have been permitted to draw an inference of negligence * * * from the occurrence of the explosion. * * *"[8]

As the committee is aware, the safety record of the atomic-energy industry to date supports the conclusion that careful operation is possible. It has been pointed out, however, that our remarkable safety record may boomerang in this field in that it suggests to the reasonable mind that an accident must, almost of necessity, occur through someone's negligence.[9]

In light of the above it is quite likely that most courts will allow a plaintiff injured by the escape of radiation to plead res ipsa loquitur, the plaintiff's total inability to prove actual negligence being apparent. Once the plea is admitted the defendant will have the burden of advancing evidence of nonnegligent operation. This could be very difficult, in fact it may be impossible. When such an impossibility arises under the ordinary rules the plaintiff will recover without actually proving negligence and that result is tantamount to strict liability.

LIABILITY OF MANUFACTURERS AND SUPPLIERS

A defect in a component part of a reactor, faulty construction of reactor facilities, and the mishandling or misuse of radioactive products may cause widespread damage and present the problem of the liability of the manufacturer,

[5] 346 U. S. 15 (1953).
[6] 22 H. and C. 722, 159, Eng. Rep. 299 (Ex. 1863).
[7] *Scott* v. *London & St. Katherine Docks Co.*, 3 H. and C. 596, 601, 159, Eng. Rep. 665, 667 (Ex. 1865).
[8] *Kleinman* v. *Banner Laundry Co.*, 150 Minn. 515 (1921).
[9] Becha & Huard, Tort Liability and the Atomic Energy Industry, 44 Georgetown L. Rev. 67, November 1955.

constructor, or supplier to injured third persons. The general rule in the United States is that "a manufacturer who fails to exercise reasonable care in the manufacture of a chattel which, unless carefully made, he should recognize as involving an unreasonable risk of causing substantial bodily harm to those who lawfully use it for a purpose for which it was manufactured and to those whom the supplier should expect to be in the vicinity of its probable use, is subject to liability for bodily harm caused to them by its lawful use in a manner and for a purpose for which it was manufactured." [10]

In the celebrated case of *MacPherson* v. *Buick Motor Company*, decided in the court of appeals in New York in 1916,[11] the court held that the manufacturer of a chattel which becomes dangerous when defectively made was liable to the ultimate consumer who was injured in the normal use of the chattel. Since that time the rule in that case has come to mean that a duty of due care devolves on a manufacturer whenever substantial harm is to be anticipated if the chattel manufactured should be defective. This duty is one of inspection which runs to the ultimate consumer and invokes the doctrine of liability based on negligence. Accordingly, plaintiff's case would fail if there was no proof of negligence.

The law which was made in the Buick case has been extended and developed to successively larger groups of persons who have had progressively less connection with the manufacturer, for example, casual bystanders.[12] To put it more precisely:

"It is now generally agreed that a seller or other supplier of chattels for consideration, may be liable for harm to the person or property of a third person who may be expected to be in the vicinity of the chattel's probable use, if he has failed to exercise reasonable care to make the chattel safe for the use for which it is supplied." [13]

An extension of the doctrine in *Moran* v. *Pittsburgh-Des Moines Steel Co.*,[14] is of special interest in the atomic energy industry. Defendant under contract with a public utility company designed, furnished materials for, and constructed a tank on the utility's land for the storage of liquefied natural gas. Thirteen months after completion and acceptance of the tank, it ruptured releasing large quantities of gas and causing fires and explosions in which more than 100 lives were lost. An employee of the utility company engaged in work unconnected with the storage of gas was killed, and an action for wrongful death was brought against the builder of the tank. The court held the defendant liable for negligent defects in manufacture to one who might reasonably be expected to be in the vicinity of the chattel's use and also that the principle applied even though the tank when installed technically became part of the structure and land of the utility company.

The decision is important in that it includes within the rule not only manufacturers of equipment but building contractors as well, and presumably defective design in engineering.

In any case, however, according to prevailing authority there must be proof of negligence. Attempts to extend the doctrine of strict liability to manufacturers of articles of equipment which prove to have a defect that causes injury have not as yet met with much success; but it can be expected that this new principle of liability will be advanced in cases involving injury or damage due to a reactor incident. Whether it will be accepted depends upon the courts and the circumstances which will exist.

GOVERNMENTAL LIABILITY AND IMMUNITY

The United States, its departments and agencies, the several States, their departments and agencies, are immune to suits by private citizens except where the State has given its consent to be sued. The Federal Government and the various State governments have all given such consents in varying degrees.

The United States has waived its sovereign immunity in the Federal Torts Claim Act, which provides that the Federal Government will be liable for the negligent and wrongful conduct of its employees except as to those acts within the "discretionary function or duty" provision of the act. Thus, I believe, it may only be in extremely limited and unusual cases that the Federal Government would incur any tort liability in its activities in the atomic energy field.

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[10] *Restatement of Torts*, sec. 395.
[11] 217 N. Y. 382, 111 N. E. 1050 (1916).
[12] *Reed & Barton Corp.* v. *Maas*, 73 F. 2d 359 (1st Cir. 1934); *McLeod* v. *Linde Air Brakes Co.*, 318 Mo. 397, 1 S. W. 2d 122 (1927).
[13] Prosser on Torts, sec. 83.
[14] 166 F. 2d 908 (3d Circ. 1948).

I believe it may also be assumed that individual State governments would treat sovereign immunity in atomic energy accident cases in much the same manner as the Federal Government. In the case of municipalities engaging in an atomic energy program there will be the question as to whether such an operation is a governmental or a proprietary one and in this area the law varies from State to State and accordingly will raise many questions with respect to ultimate liability.

This is a somewhat brief identification of the problem and is presented only to indicate that the questions which arise are substantial and the answers not easily perceived. The facts in any case will predominate and shape the results. The atomic age will not necessarily affect the doctrines and principles which I have discussed here and I, therefore, believe it can be concluded that those who contribute to the construction and operation of nuclear powerplants must assume that under some circumstances they will be legally liable for damage to third parties.

Mr. MITCHELL. The reason we are discussing this topic is to indicate the nature of the rules of law that might be applied to any particular liability which was covered either by an indemnity agreement or a reinsurance agreement issued by the Government.

We are thinking in terms of what rules the various State courts might apply as to an incident which occurred within the borders of the State. We don't know, of course, in this new area what rules will be applied, and, therefore, we look to some analogies which seem to us might be apposite here.

The first one is the doctrine of strict liability. Briefly, this is a rule of law that if someone undertakes certain ultrahazardous or inherently dangerous activities, then he is liable for any damage that may result, whether or not he is negligent or no matter how careful he has been.

This has been applied to such activities as dynamiting, storage of explosives, storage of gas, and things of this kind. It seems to us that it might conceivably be applied in this area to the owner or operator of a reactor.

The next rule of law that might be applied here is somewhat similar, but it has a little different impact. This is the rule of res ipsa loquitur, which means that if an accident occurs, then the very fact of the accident gives rise to a conclusion of negligence and the burden is then upon the owner or operator to disprove this assumption.

If he is unable to do so, then he is similarly liable. This has been applied to such circumstances as an unexplained explosion in a powder factory, boiler explosions, unexplained airplane accidents, and the like.

Representative COLE. The difference between your first principle and the second one is the matter of, if I may call it, proof, and the first one is conclusive presumption and no matter what evidence the defendant might show or advance to show his caution and his care, it doesn't absolve him of the liability?

Mr. MITCHELL. That is right.

Representative COLE. It is conclusive presumption of liability.

Mr. MITCHELL. Yes, sir.

Representative COLE. And the res ipsa loquitur is the type of liability which the defendant might offset by showing thorough care?

Mr. MITCHELL. That is right, Mr. Cole.

The other point is one that was mentioned by Senator Jackson this morning, which arises from the famous case of MacPherson against the Buick Motor Co., which briefly means this: That if a manufac-

turer or a supplier sells a component part of a machine to someone who, in turn, sells a machine or uses it, and if the component contains a hidden defect which the purchaser could not reasonably have identified by an inspection——

Representative COLE. Which purchaser?

Mr. MITCHELL. Let's take the precise case, Mr. Cole, to illustrate it. The purchaser in that case would be the Buick Motor Co. Another manufacturer had built the wheels for the car. One of the wheels had a hidden defect in it which wasn't readily identifiable by Buick's inspection.

The car was then sold to an individual. The wheel failed, the individual was damaged, and the court held that the damaged individual had a right of action against the manufacturer of the wheel.

Applying this to the situation we have here, it means that if an equipment manufacturer makes a valve or a control rod or a pump, or something of that kind, and it goes into the reactor and then this control rod or valve or pump failed and it could be shown that the manufacturer was negligent in the way he built it, he might be then liable for the reactor failure and for the damage that resulted from the total incident.

Representative COLE. The burden is on the claimant to establish affirmatively a presumption of negligence by the manufacturer of the component part?

Mr. MITCHELL. Sir, this would depend, I think, on whether you take these first two rules and extend them. I don't know just where you come out on this.

It might be that the rule of absolute liability or res ipsa would be applied only to the operator of the reactor. If it were extended to the manufacturer, then in combination with the Buick rule, you might have a very difficult situation as respects the manufacturer himself.

As I say, we don't know where we are coming out on this, but these are the possibilities. This suggestion is the area in which there might be liability.

Representative COLE. Does the Commission propose in this bill a liability on the part of the Government beyond what it presently has without the bill, with the exception of the indemnity feature in excess of the $65 million insurance?

Mr. MITCHELL. No, sir.

Representative COLE. Is that correct?

Mr. MITCHELL. That is right. Furthermore, the indemnity or reinsurance that we suggest is in the context of ordinary rules of law.

In other words, we are undertaking to indemnify only those damages which are legally recoverable.

Representative COLE. May legally recover from the operator or the manufacturer?

Mr. MITCHELL. Or the manufacturer.

Representative COLE. Not legally recoverable from the Government.

Mr. MITCHELL. That is right.

Representative COLE. By reason of the fact that the Government issued the license?

Chairman ANDERSON. Well, the Government supplies the fuel element probably, or the fuel material. It has a little responsibility of public liability in there, hasn't it?

Mr. MITCHELL. Possibly, Mr. Chairman, but there the Government's only liability would be under the Tort Claims Act, where you must have a showing of negligence on the part of some Government official, and you have further the rule of the Texas City case that, if it is the exercise of sovereign discretion, and even if there is negligence, there is no liability.

Representative COLE. Isn't it your opinion that this making available the special material is exercising a sovereign function?

Mr. MITCHELL. I think very likely it is, Mr. Cole, in which case there would be no ordinary liability on the Government.

Representative COLE. The terms of this bill do not disturb that legal status or liability on the part of the Federal Government?

Mr. MITCHELL. No, sir; and in areas other than the ones on which we specifically indemnify, the ordinary rules of Government liability or nonliability would still apply.

My other statement, Mr. Chairman, has to do with a description of the various indemnity agreements which the Commission has written in its own contracts. Again I would suggest that I place the statement in the record and then mention briefly the Duquesne arrangements, which have been mentioned this morning at this hearing.

Chairman ANDERSON. Yes, sir. I would be agreeable to that.

(The statement referred to follows:)

V. INDEMNITY AGREEMENTS WITH AEC CONTRACTORS

By William Mitchell, General Counsel, Atomic Energy Commission

Early in the operations of the Manhattan project the industrial organizations which were recruited to construct and operate the Government production facilities recognized and sought protection against the extraordinary hazards associated with the production and use of nuclear materials. The contracts negotiated by the Manhattan engineer district with Carbide & Carbon Chemicals Corp., E. I. du Pont de Nemours, the University of Chicago, and the University of California all contained broad indemnity provisions which held the contractor harmless against any loss, expense, claims, or damage arising out of or in connection with the performance of the contract.

When the operations of the Manhattan engineer district were transferred to the Atomic Energy Commission in January 1947 the Commission assumed responsibility under many contracts containing this type of indemnity provision. Insurance of the type normally available to industrial enterprises was not obtainable against the unique and unpredictable risks involved in the atomic energy industry. The Commission consequently considered it necessary and appropriate to continue to indemnify the original operating contractors and to extend similar indemnification to new contractors engaged for the operation of Commission facilities involving atomic hazards.

In general, the indemnity agreements negotiated by the Commission have followed the broad lines of the earlier indemnity agreements. In some instances, however, the indemnity agreements have been narrower in scope and have placed a higher degree of risk on the contractor. Copies of the indemnity provisions presently contained in Commission contracts are included in the appendix.

The Manhattan engineer district indemnity agreement extended to all losses, expenses, and damage arising out of or in connection with performance of the contract work. In the Commission's contract with General Electric Co. for the operation of facilities at Hanford, Wash., and Schenectady, N. Y., the indemnity has been restricted to risks that arise out of or result from the radioactive, toxic, explosive, or other hazardous properties of nuclear materials. The contract with General Electric Co. for the aircraft nuclear propulsion project contains an indemnity clause limited to risks arising out of the radioactive, toxic, explosive, or other hazardous properties of nuclear materials which General Electric manufactures, transports, possesses, uses, disposes of, or otherwise handles, under or in connection with the contract. As to these risks,

the Commission's financial responsibility is unlimited; as to the other types of risk, the commitment of the Commission is conditioned upon the availability of appropriated funds for its fulfillment.

The indemnity agreements of the Manhattan engineer district normally did not extend to losses, expenses, and damages resulting from the willful misconduct or bad faith of a corporate officer of the contractor. Generally, this was the only risk assumed by the contractor. Similar exceptions are now contained in the Commission's contracts with Union Carbide & Carbon Corp. (operation of facilities at Oak Ridge, Tenn., and Paducah, Ky.) and E. I. Du Pont de Nemours and Co. (operation of facilities at Aiken, S. C.). In other contracts, the contractor has accepted the risk of loss resulting from the willful misconduct or bad faith of its representative having general supervision and direction of the performance of the work and, in some instances, intermediate company officials have been included. In this group are General Electric Co. (operation of Hanford, Wash., and Knolls Atomic Power Laboratory, and aircraft nuclear propulsion project), the University of Chicago (Argonne National Laboratory), University of California (Los Alamos Scientific Laboratory), Goodyear Atomic Corp. (operation of production facilities at Portsmouth, Ohio), and Westinghouse Electric Corp. (design and construction of nuclear reactors). The Phillips Petroleum Co., in its contract for operation of the National Reactor Testing Station, Arco, Idaho, has accepted the risk of losses resulting from (*a*) the bad faith or willful misconduct of a corporate officer, of the project manager, or of any representative of the company having general supervision or direction of substantially all the contract work; (*b*) its failure to exercise the degree of management responsibility required by ordinary business standards; (*c*) action taken by the contractor without obtaining the approval of the Commission when approval is required by the contract terms; and (*d*) use of any invention or discovery or infringement of any patent unless the use or infringement is authorized by the Commission. In one contract, that with Western Electric Co., Inc., for operation of Sandia Laboratory, there is no exception to the applicability of the indemnity agreement.

The Commission has entered into one indemnity agreement with a company furnishing services to an operating contractor. Phillips Petroleum Co., in connection with its contract operation of the materials testing reactor at Arco, desired to contract on a fixed-price basis with the Babcock & Wilcox Co. for the fabrication of enriched fuel elements for the reactor. In order to induce Babcock & Wilcox to enter into the contract with Phillips, and because of the unavailability of insurance to protect Babcock & Wilcox against the nuclear hazard involved, the Commission agreed to indemnify Babcock & Wilcox. The indemnity was limited to nuclear hazards and Babcock & Wilcox assumed the risk of loss or damage caused by unauthorized subcontracting or due to bad faith, willful misconduct, or gross negligence on the part of a corporate officer or any of its managers, superintendents, or equivalent representatives who have supervision or direction of all or substantially all of the work.

The contract with the Duquesne Light Co. for the PWR plant at Shippingport, Pa., involves the operation of mixed facilities—the nuclear portion being the property of AEC and the turbine-generator portions of the plant being owned by Duquesne. In these circumstances the Commission considered it proper to indemnify Duquesne against loss or damage arising out of the radioactive, toxic, explosive, or other hazardous properties of nuclear materials used, possessed, or handled under or in connection with the contract. The indemnity does not apply if the loss or damage is caused by bad faith, willful misconduct, or gross negligence on the part of a corporate officer of the company or on the part of any of its managers, superintendents, or equivalent representatives who has supervision or direction of all or substantially all of the operation of the nuclear plant.

In the case of research and development work conducted in private or mixed facilities and involving work with source and special nuclear materials, AEC has found it necessary on a few occasions to grant indemnification. The contract with Battelle Memorial Institute (contract No. W–7405–Eng–92) contains a broad indemnity of the type commonly found in the contracts for operation of AEC production facilities. The more recent contracts in the field of reactor development to be performed in private or mixed facilities; e. g., contracts with North American Aviation, Inc., for the sodium reactor experiment and the organic moderated reactor program; Combustion Engineering, Inc., for the design and assembly of the SRS submarine reactor; and Sylvania Electric Products, Inc., for development of reactor fuel elements, all contain indemnity agreements

more limited in their scope. They cover only those losses and damage arising out of the special hazards of nuclear materials used, possessed, or handled under the contract. They impose upon the contractor the risk of loss or damage caused by the bad faith, willful misconduct, or gross negligence of a corporate officer or of any company representative having supervision or direction of all or substantially all of the work under the contract. The indemnity provision contained in contract No. AT(30-3)-198 with Combustion Engineering, Inc., is included in the appendix as typical of the indemnities afforded to contractors performing reactor development work in private or mixed facilities.

GENERAL ELECTRIC COMPANY

Contract No. W-31-109-ENG-52; Supplemental Agreement No. 33

ARTICLE XXXIV. RESPONSIBILITY OF CONTRACTOR—ATOMIC HAZARDS

1. The Government deems the work to be performed under this Contract to be essential in the interest of the common defense and security and has requested the Contractor to undertake such work. Accordingly, and notwithstanding any other provision of this Contract, but subject to the provisions of Section 2 of this Article, the Contractor shall not be liable for and the Government shall indemnify and hold the Contractor harmless against any delay, failure, loss, liability, expense or damage of any kind and for any cause whatsoever, arising out of or connected with the work under this Contract, not compensated by insurance or otherwise, which the Contractor has itself sustained to its tangible property or for which it is legally liable, and which arises out of or results from the radioactive, toxic, explosive or other hazardous properties of source, special nuclear, byproduct or radioactive material, or of other material capable of releasing substantial quantities of atomic energy, and whether or not any person or persons employed by or acting for or in behalf of the Contractor is or are responsible therefor, unless the Government shall establish that such delay, failure, loss, liability, expense or damage shall have been caused directly by bad faith or willful misconduct on the part of the Contractor's President, Chairman of the Board of Directors, a Vice President, Secretary, Treasurer, Comptroller, General Manager of its Atomic Products Division, General Manager of the Plant, or General Manager of the Laboratory, acting within the scope of his or their authority and employment. As used in the preceding sentence, the terms "delay" and "failure" shall include but not be limited to any breach by the Contractor of any obligation under this Contract; the terms "loss" and "liability" shall include but not be limited to loss or liability assumed by contract, approved by the Commission, for acts or omissions of the Contractor's personnel; the term "expense" shall include but not be limited to the expense of litigation; and the term "damage" shall include but not be limited to personal injuries and deaths of persons whether employees of the Government, employees of the Contractor, or any other persons, and damage to property whether owned by the Government, the contractor, or a third party. The Government shall pay directly and discharge completely all final judgments entered against the Contractor in litigation within the scope of this Article XXXIV and all claims within the scope of this Article XXXIV which may be settled by agreement approved by the Commission unless the Government shall advance to the Contractor sufficient funds for the payment and discharge thereof. The provisions of this Article XXXIV shall survive the expiration of termination of this contract.

2. The provisions of section 1 of this Article XXXIV shall not apply to any delay, failure, loss, liability, expense or damage arising out of or connected with (*a*) the use by the Contractor otherwise than as a part of or in connection with the work under this Contract (it being understood that the work under the Contract does not include work performed under section 8 (b) of Article II) of materials, equipment, facilities, drawings, designs, devices, data or inventions that have been manufactured, fabricated, prepared, produced, procured, conceived, or developed by the Contractor or made available to the Contractor as part of or in connection with the work under this Contract, unless and only to the extent that the written approval by the Commission of such use expressly makes the provisions of section 1 applicable thereto; or (*b*) the use by any third party, otherwise than as part of or in connection with the work under this Contract, of any such materials, equipment, facilities, drawings, designs, devices, data or inventions supplied, licensed, disclosed or otherwise made available by the Contractor for such use by the third party unless such supplying, licensing,

disclosing or making available by the Contractor is part of the work under this Contract or is otherwise approved in writing by the Commission. For the purposes of this section 2, use in projects under the Contractor's United States Navy ontracts NObs–56405, NObs–61811 and NObs–61917 shall be deemed use in connection with the work under this Contract.

WESTERN ELECTRIC COMPANY

Contract No. AT (29–1)–789, Mod. No. 16

ARTICLE V. ASSUMPTION OF RISK BY GOVERNMENT

1. The parties recognize that the work under this contract involves unusual, unpredictable and abnormal risks. In view of these circumstances and the no-profit feature of the contract, neither Western, Sandia Corporation, Bell Laboratories, nor any company of the Bell System, shall be liable for, and the Government shall indemnify and hold them harmless against, any delay, failure, loss, expense (including expense of litigation), or damage (including personal injuries and deaths of persons and damage to property) of any kind and for any cause whatsoever, arising out of or connected with the work, and whether or not any employee or employees of any such company is or are responsible therefor. The Government shall either assume, or authorize Sandia Corporation in its behalf to carry on, the defense of all claims or legal proceedings which may be asserted or instituted against any such company on account of acts or omissions in the performance of the work, except that if the Government elects to assume such defense, Sandia Corporation at its option may participate therein without affecting its rights under this Article. The Government shall pay directly and discharge completely all final judgments, including assessed costs, entered against any such company and all claims which may be settled by agreement approved by the Commission, except that, in the case of workmen's compensation awards, Sandia Corporation shall, and in any other case may with the approval of the Commission, make payment. The Government's obligations under this Article shall not be subject to the limit established from time to time under Article IV, and it is recognized that additional appropriations may be required to discharge obligations under this Article.

UNION CARBIDE AND CARBON CORPORATION

Contract No. W–7406–ENG–26; Supplemental Agreement No. 27

ARTICLE IX. RESPONSIBILITY OF CONTRACTOR—CONTINGENCIES

(A) It is the understanding of the parties hereto, and the intention of this contract, that all work under this contract is to be performed at the expense of the Government and that the Government shall hold the Contractor harmless against any loss, expense (including, but not limited to, expense of litigation), or damage (including, but not limited to, liability to third persons because of death, bodily injury, property injury, destruction, patents, or otherwise) of any kind whatsoever arising out of or in connection with the performance of the work under this contract, except to the extent that such loss, expense, damage or liability is due to the willful misconduct or bad faith on the part of any of the corporate officers of the Contractor in the performance of the work under this contract.

UNIVERSITY OF CALIFORNIA

Contract No. W–7405–ENG–36; Modification No. 32

ARTICLE XIV. RESPONSIBILITY OF CONTRACTOR—CONTINGENCIES

1. The Commission deems the performance of the work hereunder by the Contractor to be essential in the interest of the common defense and security of the United States. The Commission and the Contractor recognize that, in part, this work involves unusual, unpredictable, and abnormal risks.

2. In view of these circumstances and the fact that the Contractor is undertaking the work without fee or profit, the Commission and the Contractor agree that all work under this contract is to be performed at the expense of the Government, and that the Contractor shall not be liable for, and the Government shall

indemnify and hold the Contractor harmless against any delay, failure, loss, expense (including expense of litigation), or damage (including personal injuries and deaths of persons and damage to property) of any kind and for any cause whatsoever, arising out of or connected with the work, including any loss, expense or damage arising out of or connected with the unauthorized doing of business by the Contractor within the jurisdiction or jurisdictions where this contract is being performed, and whether or not any employee or employees of the Contractor is or are responsible therefor, unless such delay, failure, loss, expense or damage should be established by the Government to have been caused directly by bad faith or willful misconduct on the part of some Corporate Officer or Officers of the Contractor or of any person acting as Laboratory Director; and that the Government shall pay directly and discharge completely all final judgments including assessed costs, entered against the Contractor and all claims which may be settled by agreement and approved by the Commission.

WESTINGHOUSE ELECTRIC CORPORATION

AT (11-1)-GEN-14

ARTICLE XIV. CONTINGENCIES—LITIGATION AND CLAIMS—INSURANCE

1. It is agreed that all work under this contract is to be performed at the expense of the Government and that Westinghouse shall not be liable for and the Government shall indemnify and hold Westinghouse harmless against any delay, failure, loss or damage (including personal injuries and deaths and property damage), and any expenses in connection therewith (including expenses of litigation), not compensated by insurance or otherwise, sustained by Westinghouse arising out of or connected with the work, including, without limitation, claims by employees under any state or Federal law relating to the compensation of employees, and any loss or damage and incidental expenses connected with any alleged liability for patent infringement or for breach of any obligation of Westinghouse existing at the effective date of this contract to grant patent rights to third parties. Except as may otherwise be agreed to by the parties, all payments for claims for loss or damage under this section shall be approved in advance by the Commission, and proper releases shall be obtained in all appropriate instances. Westinghouse and the Commission shall jointly develop procedures for handling all such claims.

* * * * * * *

3. No obligations are imposed upon the Government by this Article where the Government shall establish that the delay, failure, loss, expense or damage sustained by Westinghouse or claimed against it was caused directly by bad faith or willful misconduct on the part of some corporate officer or officers of Westinghouse, or on the part of any other representative having general supervision or direction of the work under this contract or on the part of the Manager of its Atomic Power Division.

4. The liability of the Government under this Article XIV shall not be subject to the dollar limitation under Article V, and shall survive completion of this contract, and termination of this contract as provided in Article XVI. To the extent that funds for payments by the Government under this Article are not available to the Commission for purposes of this contract, such payments will be subject to the availability of funds from the Commission, Congress, or other sources.

UNIVERSITY OF CHICAGO

Contract No. W-31-109-ENG-38; Supplement No. 13

ARTICLE XIII. CONTINGENCIES—CLAIMS AND LITIGATION—ADMINISTRATIVE RULINGS—INSURANCE

1. (*a*) It is understood that all work under this contract is to be performed at the expense of the Government and that the University, being a nonprofit organization, has undertaken the work on the basis of reimbursement for all its costs. In view of this understanding and the unusual, unpredictable hazards involved in carrying out the work, it is agreed that the University shall not be liable for and the Government shall indemnify and hold the University, its trustees and officers, jointly and severally harmless against any loss, or damage (including any personal injuries or deaths of persons and damage to property),

and any expense in connection therewith (including expenses of litigation together with reasonable attorneys' fees incident thereto), not fully compensated by insurance or otherwise, arising out of or connected with the work, including any loss, damage, or incidental expense connected with any alleged liability for patent infringement. It is understood that the Government is obligated under this section whether or not any employee or employees of the University is or are responsible therefor, unless such loss, damage, or expense shall be established by the Government to have been caused directly by bad faith or willful misconduct on the part of some corporate officer or officers of the University or the director or business manager of the Laboratory.

(*b*) The liability of the Government under this Article XII shall not be subject to the dollar limitation under Article V, subject to the availability of funds, and shall survive completion of this agreement and termination of this agreement as provided in Article XXII. To the extent that funds are not available for payments under this Article XIII, the Commission will use its best efforts to obtain such funds from the Congress or other sources.

E. I. DU PONT DE NEMOURS AND COMPANY

Contract AT (07–2)–1

ARTICLE XXXIV. RESPONSIBILITY OF CONTRACTOR—CONTINGENCIES

The Government deems the work to be performed under this contract to be essential in the interest of the common defense and security and has urgently requested the Contractor to undertake such work. In view of the fact that the Contractor is undertaking the work for a fixed fee of one dollar ($1.00), and in view of he unusual and unpredictable hazards involved in carrying out the work under this contract, and in view of the nature, scope, and magnitude of the work, it is agreed that, notwithstanding any other provision of this contract, all work under this contract is to be performed at the expense of the Government, and that the Contractor shall not be liable for, and the Government shall indemnify and hold the Contractor harmless against any delay, failure, loss, expense (including expense of litigation) or damage (including personal injuries and deaths of persons and damage to property) of any kind and for any cause whatsoever arising out of or connected with the work, and whether or not any employee or employees of the Contractor is or are responsible therefor, unless such delay, failure, loss, expense or damage shall be established by the Government to have been caused directly by bad faith or willful misconduct on the part of some corporate officer or corporate officers (i. e., the Chairman of the Board of Directors, President, Vice Presidents, Secretary, Assistant Secretaries, Treasurer, Assistant Treasurers) of the Contractor acting within the scope of his or their authority and employment.

GOODYEAR ATOMIC CORPORATION

Contract No. AT (33–2)–1

ARTICLE IX. RESPONSIBILITY OF CONTRACTOR—CONTINGENCIES

2. It is the understanding of the parties hereto, and the intention of this contract, that all work under this contract is to be performed at the expense of the Government and that the Government shall indemnify and hold the Contractor harmless against any loss, expense (including, but not limited to, expense of litigation), or damage (including, but not limited to, liability to third persons because of death, bodily injury, property damage or destructon, or otherwise), of any kind whatsoever arising out of or in connection with the performance of the work under this contract, unless such loss, expense, damage, or liabiilty results directly from willful misconduct or lack of good faith on the part of any corporate officer of the Contractor or any representative of the Contractor having supervision and direction of the Plant as a whole.

INDEMNITY AGREEMENT BETWEEN AEC AND THE BABCOCK AND WILCOX COMPANY IN CONNECTION WITH CONTRACT NO. C–200 BETWEEN THE BABCOCK AND WILCOX COMPANY AND PHILLIPS PETROLEUM COMPANY, ACTING AS AEC PRIME CONTRACTOR UNDER CONTRACT NO. AT (10–1)–205

In consideration of the execution and delivery of that certain Contract No. C–200 by The Babcock and Wilcox Company, as contractor thereunder with

Phillips Petroleum Company (as Commission contractor under Contract AT (10–1)–205, and subject to the availability of funds, the Government shall indemnify and hold The Babcock and Wilcox Company harmless against loss or damage (including personal injuries and deaths of persons whether employees of the Government, Phillips, or of The Babcock and Wilcox Company, or any other persons and damage to property whether owned by the Government, Phillips, The Babcock and Wilcox Company, or a third party), and any expense in connection therewith (including the expense of litigation) not compensated by insurance or otherwise, of any kind or for any cause whatsoever (including negligence) arising out of radioactive, toxic, explosive or other hazardous properties of source, special nuclear or radioactive materials, which The Babcock and Wilcox Company may use, possess or otherwise handle under or in connection with said Contract No. C–200, with Phillips, whether or not any director, officer, employee, or agent of Babcock and Wilcox is responsible therefor, except that the Government shall have no obligation to indemnify Babcock and Wilcox for such loss or damage caused by any unauthorized subcontractor under an unauthorized subcontract as that term is defined in said Contract No. C–200, or by bad faith, willful misconduct or gross negligence on the part of some corporate officer or officers of The Babcock and Wilcox Company or by any of its managers, superintendents, or equivalent representatives who have supervision or direction of all or substantially all of the work under said contract.

PHILLIPS PETROLEUM CO.

AT (10–1)–205

ARTICLE V

5.1 *Reimbursable Costs and Expenses*

a. The Government shall reimburse the Contractor for all direct and indirect costs actually incurred by the Contractor in its lawful performance of the Work under this contract which are necessary and incident thereto unless expressly excluded by other provisions of this contract or unless determined by the Commission to have resulted from (*a*) failure of the Contractor to exercise the degree of management responsibility required by ordinary business standards; (*b*) the willful misconduct or lack of good faith on the part of (i) a corporate officer or director of the Contractor, (ii) the Project Manager or (iii) any other representative of the Contractor having General supervision or direction of substantially all of the work generally defined in Article II; (*c*) action taken by the Contractor without obtaining an approval or authorization from the Commission which is required by any provision of this contract unless such failure to obtain approval is excused under the provisions of paragraph 23.3; or (*d*) the use of any invention or discovery or the infringement of any patent as contemplated by paragraph 23, hereof, unless such use or infringement is authorized by the Commission or is excepted from the Contractor's indemnity to the Commission under the provisions of subparagraph 23.*d*. Without limiting the generality of the foregoing, reimbursable direct and indirect costs shall include (1) the items described as examples of reimbursable direct and indirect costs in subparagraphs 5.1.*b*. and *d*.; (2) the indirect costs allowed under subparagraph 5.1.*c*.; and (3) damages, losses, litigation expenses, attorneys' fees and claims (including settlements thereof made with the Commission's approval) arising from the Contractor's lawful performance of the work *hereunder* unless the same shall be determined by the Commission to have resulted from any of the causes enumerated in clauses (a) through (d) of the preceding sentence.

ARTICLE XI

11.1 *Indemnity.*—Notwithstanding the provisions of paragraph 7.1, hereof except as to any risks, hazards or liabilities, and claims or expenses resulting therefrom, expressly assumed by the Contractor or for which payment shall not be allowed the Contractor under any provisions of this contract, the Commission, to the extent funds are available, hereby indemnifies and agrees to hold the Contractor harmless from and against any and all claims for damages to persons or property and expenses incurred in conjunction therewith to the extent such claims and expenses arise or result from any risk or hazard not covered by insurance in the event the Contractor has procured and is maintaining the insurance required under paragraph 11, and/or to the extent such claims and expenses exceed the limits of insurance so procured and maintained or exceed the

amounts actually received by the Contractor from the insurance carrier(s). The liability of the Government under this paragraph shall not be subject to any dollar limitation specified by the Commission pursuant to paragraph 4.4. and shall survive completion or termination of this agreement pursuant to its terms. To the extent that funds for payments by the Government under this paragraph 11.1. are not available to the Commission, such payments will be subject to the availability of funds from the Congress or other sources, and the Commission will use its best efforts to obtain such funds. Unavailability of funds for the fulfillment of the Commission's obligations under this paragraph 11.1. shall not preclude the Contractor from asserting any claims it may have under this indemnity in any court of competent jurisdiction.

GENERAL ELECTRIC COMPANY

Contract No. AT (11-1)-171

ARTICLE XIV. INDEMNITY AGAINST ATOMIC ENERGY HAZARDS, INSURANCE AND INDEMNITY AGAINST OTHER HAZARDS; AND LITIGATION AND CLAIMS

1. Indemnity Against Atomic Energy Hazards

(*a*) The Government deems the work to be performed under the ANP Program to be in the national interest and has requested General Electric to undertake such work. General Electric shall not be liable for, and the Government shall indemnify and hold General Electric harmless against any delay, failure, loss, civil liability (including liability assumed by other contracts for acts and omissions of General Electric personnel and loss or civil liability imposed or incurred by reason of any failure or insufficiency of any article, material, equipment or product manufactured or furnished by General Electric for use in connection with this work), or damage (including personal injuries and deaths of persons whether employees of the Government, employees of General Electric or any other persons, and damage to property whether owned by the Government, General Electric, or a third party) and any expense in connection therewith including the expense of litigation), not compensated by insurance or otherwise, of any kind and for any cause whatsoever (including negligence), arising out of the radioactive, toxic, explosive or other hazardous properties of source, fissionable or radioactive materials, which General Electric manufacturers, transports, possesses, uses, disposes of or otherwise handles, under or in connection with this contract whether or not any director, officer, employee, or agent of General Electric is responsible therefor except as otherwise provided in Section 3. a. of this Article.

(*b*) The liability of the Government under this Section 1. of Article XIV shall not be subject to the dollar limitation under Article V, and shall survive completion of this agreement, and termination of this agreement as provided in Article XVI.

2. Insurance and Indemnity Against Other Hazards

(*a*) When approved by the Commission in writing, General Electric shall procure and maintain such available bonds and insurance in connection with the performance of work under this contract in such forms and in such amounts and for such periods of time as the Commission may require or approve. Except as may otherwise be approved by the Commission, such insurance policies shall exclude any claim on the part of the insurer or obligor to be subrogated, upon payment of a loss or otherwise, to any claim against the United States. General Electric may carry, and with the approval of the Commission, be reimbursed for the cost of reasonable insurance covering General Electric property or property for which General Electric is responsible to someone other than the Government and which is used in the performance of the contract. The indemnity provisions of Sections 1 and 2 of this Article shall not apply to losses, destruction or damage to property for which General Electric would have been indemnified or compensated by insurance but for failure of General Electric to procure or maintain available bonds or insurance in accordance with written requirements of the Commission.

(*b*) Subject to Section 3 (*b*) of this Article, the Government shall also indemnify and hold General Electric harmless against any delay, failure, loss, civil liability (including liability assumed by other contracts for acts and omissions of

General Eleectric personnel), or damage (including personal injuries and deaths of persons whether employees of the Government, employees of General Electric or any other persons, and damage to property whether owned by the Government, General Electric or a third party) of any kind and for any cause whatsoever (including negligence) and any expenses in connection therewith (including expenses of litigation), not compensated by insurance or otherwise and which are not reimbursable and reimbursed under Section 1 of this Article, sustained by General Electric arising out of or connected with the work under this contract including, without limitation, claims by employees under any State or Federal law relating to the compensation of employees, and any loss, liability or damage and incidental expense connected with any alleged liability for patent infringement. It is understood that the indemnity under this subsection 2 (*b*) is not intended to cover loss or expense to General Electric arising out of disallowances by the Government of non-reimbursable costs under Article X and Appendix A.

(*c*) The liability of the Government under this Section 2 of Article XIV shall not be subject to the dollar limitation under Article V, and shall survive completion of this agreement, and termination of this agreement as provided in Article XVI. To the extent that funds for payments by the Government under this Section 2 of Article XIV are not available to the Commission, such payments will be subject to the availability of funds from the Congress, or other sources, and the Commission will use its best efforts to obtain such funds.

3. (*a*) No obligations are, however, imposed upon the Government by Section 1 of this Article or by Articles IX and X of this contract where the delay, failure, loss, liability, damage, or expense sustained by General Electric or claimed against it was caused directly by bad faith or willful misconduct on the part of some corporate officer or officers (i. e., the Chairman of the Board of Directors, President, Vice Presidents, Secretary, Treasurer, or Comptroller) of General Electric or on the part of the General Manager of its Atomic Products Division, the General Manager of its Aircraft Nuclear Propulsion Department, or the Manager, Idaho Test Station all acting within the scope of his or their authority and employment.

(*b*) No obligations are, however, imposed upon the Government by Section 2 of this Article or by Articles IX and X of this contract where the delay, failure, loss, liability, damage, or expense sustained by General Electric or claimed against it was caused directly by bad faith or willful misconduct on the part of some director, corporate officer or officers of General Electric or on the part of the General Manager of its Atomic Products Division, the General Manager of its Aircraft Nuclear Propulsion Department, or the Manager, Idaho Test Station, all acting within the scope of his or their authority and employment.

COMBUSTION ENGINEERING INC.

Contract No. AT (30-3)-198

ARTICLE XVII. INDEMNITY

Subject to the availability of funds, the Government shall indemnify and hold the Contractor harmless against loss or damage (including personal injuries and deaths of persons whether employees of the Government, employees of the Contractor, or any other persons, and damage to property whether owned by the Government, the Contractor or a third party), and any expense in connection therewith (including the expense of litigation) not compensated by insurance or otherwise, of any kind or for any cause whatsoever (including negligence), arising out of radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or radioactive materials, which the Contractor may use, possess, or otherwise handle under or in connection with this contract, whether or not any director, officer, employee, or agent of the Contractor is responsible therefor, except, that the Government shall have no obligation to indemnify the Contractor for such loss or damage caused by bad faith, willful misconduct, or gross negligence on the part of some corporate officer or officers of the Contractor or on the part of any of its managers, superintendents, or equivalent representatives who has supervision or direction of all or a substantial part of the work performed hereunder.

THE DUQUESNE LIGHT COMPANY

ARTICLE XIII. INDEMNITY—INSURANCE

1. *Indemnity Against Atomic Energy Hazards*

The Government shall indemnify and hold the Company harmless against loss or damage (including personal injuries and deaths of persons whether employees of the Government, employees of the Company, or any other persons, and damage to property whether owned by the Government, the Company or a third party), and any expense in connection therewith (including the expense of litigation) not compensated by insurance or otherwise, of any kind or for any cause whatsoever (including negligence), arising out of radioactive, toxic, explosive or other hazardous properties of source, special nuclear, or radioactive materials, which the Company may use, possess or otherwise handle under or in connection with this contract, whether or not any director, officer, employee, or agent of the Company is responsible therefor, except, that the Government shall have no obligation to indemnify the Company for such loss or damage caused by bad faith, willful misconduct or gross negligence on the part of some corporate officer or officers of the Company or on the part of any of its managers, superintendents or equivalent representatives who has supervision or plant direction of all or substantially all of the operation of the nuclear plant.

Chairman ANDERSON. I would hope that sometime while you are here you would run through the act if you feel you should and discuss any theories that are there or any provisions that are there, as to what the coverage is under the act, or you can submit a statement later on, but it did seem to me that it might be important to know what your reacion was to each one of the sections of this act. We got into the hazard indemnity fund a little bit this morning.

Mr. MITCHELL. You are referring now, Mr. Chairman, to our proposed bill?

Chairman ANDERSON. The proposed bill; yes.

Mr. MITCHELL. I will be glad to do that, sir.

Chairman ANDERSON. Why don't you go ahead with your final section here and if we have time go to the proposed bill.

Mr. MITCHELL. I would suggest on this final section I mention orally the arrangements on the Duquesne reactor. As the committee is aware, the arrangements on the Shippingport reactor are these: The Commission has made a contract with Westinghouse to build the reactor and with Duquesne to operate it. The reactor itself will be the property of the Government, and with respect to both Westinghouse and Duquesne our contracts contain indemnity provisions which undertake to indemnify and hold harmless Westinghouse and Duquesne, respectively, against atomic hazards, with the one exception that willful misconduct, bad faith, and gross negligence on the part of corporate officers or plant superintendents are not included.

You find in the appendix to my statement the text of the particular provision in the Westinghouse contract, and the provision in the Duquesne contract. These, in general, are similar to the provisions in most of our operating contracts, and they do place the Government in a position where it has agreed to indemnify the constructor and the operator of this reactor plant.

This is similar, in general, to the proposal in our bill which would extend this same type of indemnity coverage to private owners of reactors.

As to our bill, Mr. Chairman, what we are proposing is an amendment to the Atomic Energy Act of 1954 which would add a new section with a number of subsections. Subsection A would authorize the

Commission for a period of 10 years from the date of enactment of the section—and this is a misprint in your copy. It reads "date of enactment of this act." It should be enactment of this section, since this would become a part of the Atomic Energy Act.

Chairman ANDERSON. That would make 2 years' difference in the termination.

Mr. MITCHELL. Yes, sir. This would authorize the Commission to enter into agreements with the holder of a permit or license, except for those issued to the Government, since under the Atomic Energy Act in some instances the Commission will be licensing other Government agencies, and obviously we won't be providing an indemnity program for them, for the construction or operation of any production or utilization facility within the United States—this would include not only reactors, but fuel-fabricating plants, chemical processing plants, and the like—to indemnify and hold harmless the permittee or licensee himself, and also any owner, operator, manufacturer, designer, or builder of such facility or any part thereof, and any supplier of equipment, material, or services for such facility—and this we have included because of what I mentioned earlier, about the possibility of designers, suppliers, and manufacturers—against liability to persons—and here we added in parentheses that employees and agents of the Commission are included because in the definitions of the act, agents of the Commission are not persons, and obviously in this contention they should be—for death, bodily injury, or property damage, including loss of use.

The Commission's authority to make such agreements would last only for 10 years, but the agreements that the Commission wrote within this 10-year period could last for the length of the license or permit.

Chairman ANDERSON. Would that give those with a license for the next 10 years any advantage? I am frank to say that I would like to see that limited, because I think after they have had 10 years' experience in the insurance field, they will be able to take this over completely itself, and the Government will not be needed as a reinsurer.

Mr. MITCHELL. That is our hope, Mr. Chairman, and we thought as we approached the end of the 10-year period, if something more were necessary, presumably the Congress could act at that time, but we hope at the end of 10 years perhaps this will no longer be necessary.

We set forth a number of conditions with respect to these proposed agreements, the first being that the Government shall have no obligation under the agreement for liability to persons indemnified; and what we had in mind was this: Let us assume now that the owner of a reactor has an accident. He suffers a loss, and he in turn is able to establish that it was the manufacturer of a part which was responsible for this. He makes a claim against the manufacturer for loss of use or property damage. We saw no reason why the Government should intervene there and protect the manufacturer against his liability to the licensee.

Chairman ANDERSON. Even if he got a judgment larger than the licensee could pay?

Mr. MITCHELL. The situation there, Mr. Chairman, as we see it, would be limited to the property damage or loss of use of a plant. We are not thinking of third party liability here, but rights between the parties themselves.

Chairman ANDERSON. It is immaterial. I am just going back to the question: Supposing this other company that made the part does not have insurance?

Mr. MITCHELL. I think that most manufacturers carry product insurance, which would cover this kind of a loss, or perhaps they have some contractual arrangement between themselves.

Our second proviso is that the indemnity agreement shall not cover workmen's compensation claims, on the theory that these can be otherwise provided for. The insurance companies have indicated informally that with respect to reactors, they can provide workmen's compensation insurance over and above the amount they are talking of in terms of public liability.

The third proviso is one that we have already described, namely, that the agreements we write will take hold only at the point that nongovermental insurance is unavailable on the open market, and we further contemplate under this proviso that we can reexamine this question from time to time. If the private companies, as we hope, are able to increase their coverage gradually, then the Commission will reexamine its indemnity agreements and lift the floor, so to speak, under which the Government is obligated.

Chairman ANDERSON. That would take care of that point of discrimination I raised a minute ago against a new company, and satisfactorily, because if you raised the limit up to $200 million, and find $300 million, and a new company came along and did not get any Government reinsurance by your raising it up to what the new limit was, you would remove this insurance coverage that the old companies had and put them all on the same basis?

Mr. MITCHELL. Yes, sir.

Chairman ANDERSON. This takes care of it completely?

Mr. MITCHELL. That was our thought. We plan to do this on an annual basis so there might be some lapse of months there where there would be some disparity, but it will not be of major importance.

The fourth proviso is what we ordinarily include in our own contracts, namely, limiting the hazards to radioactive hazards.

Representative COLE. Do you consider electric energy as a byproduct material?

Mr. MITCHELL. No, sir; byproduct material is defined in the act, Mr. Cole. It means radioactive material.

Representative COLE. Very well.

Mr. MITCHELL. The fifth proviso simply says that our liability will be limited to occurrences during the effective term of the permit or license.

Representative COLE. That would include extensions of the license?

Mr. MITCHELL. Yes, sir; it would.

Finally, this limitation on bad faith, willful misconduct, or gross negligence of the individuals licensed or corporate officers if the licensee is a corporation or plant superintendent, which we discussed this morning.

Representative COLE. What would be the great harm if that were eliminated?

Mr. MITCHELL. It could be done either way, Mr. Cole. I think it is a matter of judgment. The practical effect of this is, of course, that if the accident should arise from the willful misconduct, say, of

the vice president of the company, then the company's assets would be at risk, but I think this is a matter of judgment as to how you want to come out with it.

Representative COLE. Under normal relationships, of course, that is a logical and sensible provision, but it seems to me that in view of the fact that the only reason we are spending so much time in this thing is because of the great uncertainty involved in these possible damages, you might eliminate that provision and the Commission indemnify the operator, even though his own employees are the ones that deliberately do it.

Mr. MITCHELL. We have, of course, included this exception in most of our indemnity agreements under out operating contracts, but this again, I think, is a matter of judgment, and if the Congress indicated to us that you did not want to have us do this with private indemnity agreements, we would probably take another look at our contracts in this respect.

Representative COLE. For the time being you can leave it in anyway.

Mr. MITCHELL. Subsection B, has to do with the annual charge, and I think there has been quite a lot of discussion on this.

Subsection C has to do with reinsurance, which the committee will notice is an alternative. It is authority to the Commission. As we have indicated, we do not know at the moment whether the private insurance companies will choose to take advantage of this, but the authority is here in case they do, and to the extent that they do.

Chairman ANDERSON. Will you tell us what this does now, again?

Mr. MITCHELL. This, Mr. Chairman, gives the Commission alternative authority to make reinsurance agreements with the private companies. As a practical matter, this presupposes that the private companies are interested in coming to the Government for reinsurance. This is above the $65 million.

Chairman ANDERSON. If insurance companies carry all the atomic hazard thing up to $65 million, what are they going to do about giving you some reinsurance on your part?

Mr. MITCHELL. I am not at all sure that this will be used.

Chairman ANDERSON. If they exhausted their carrying capacity at $65 million, how can they then come in and reinsure you?

Mr. MITCHELL. The Government will be reinsuring them, sir.

Chairman ANDERSON. You are going to insure the insurance companies?

Mr. MITCHELL. Yes, sir; above $65 million only, Mr. Chairman.

Chairman ANDERSON. You propose that they are going to come in with $65 million insurance and collect premiums on it, and then you are going to come back and give them a reinsurance policy on a portion of that $65 million to cut their net liability down to $5 or $10 million?

Mr. MITCHELL. No, sir.

Chairman ANDERSON. What do you propose?

Mr. MITCHELL. We are proposing that this reinsurance provision take hold only above $65 million. That is the way we have written the bill.

Chairman ANDERSON. You were going to take all above $65 million. Now you are going to let them take part of it and you reinsure them?

Mr. MITCHELL. Yes, sir; above $65 million.

Chairman ANDERSON. If we are going to take the liability, we are going to have the money. That is fundamental in the insurance business.

Mr. MITCHELL. I am sure the Commission would be perfectly happy to have the committee decide this anyway it wished. I think we can accomplish what we are seeking here either by indemnity and reinsurance or by indemnity only.

Representative COLE. You said this morning that the reinsurance people did not want this reinsurance provision, or they were not too happy about it.

Mr. MITCHELL. This is our indication today. We do not know whether they might change their minds.

Representative COLE. I was only going to speculate that this might be a wise provision to anticipate the future development resulting from experience in which the insurance companies might see an opportunity to go above the $65 million ceiling through some Government participation.

Mr. MITCHELL. It might be a convenient way of going at it within certain ranges, I think.

Chairman ANDERSON. Do you see any objection fundamentally to the insurance companies carrying the first $65 million and the Government assuming everything above $65 million up to a stated amount? I think there ought to be a top limit on it, but that is not too essential, and taking a proportion of the premium collected by the insurance company which has ostensibly at least measured the risk and decides that the risk is such that this premium on this policy for a certain company is going to be $250,000. Now, if you come along afterward and say for another $2,500, a thousand dollars, or whatever you want to say, $10,000, you will take everything above $65 million up to infinity, I do not see what would be wrong with that.

I can see a lot wrong in allowing an insurance company to take over and collect a fee for it and you grant them reinsurance.

Mr. MITCHELL. I think our thought was here, Senator, that reinsurance gets us a little closer to the normal pattern, and it might be that, say, private insurance company would carry their own insurance for $65 million. Perhaps there might be reinsurance for $100 million above that, and then we go to the indemnity above the $165 million.

Subsection D simply provides that the agreement must be in writing and may include such terms and conditions not inconsistent with the section as the Commission deems appropriate.

Subsection E establishes the Fedweral atomic insurance indemnity fund, the net proceeds to be invested on the advice of the Secretary of the Treasury.

Subsection F has to do with the borrowing power, and I think I suggested this morning that the first line, in order to clarify what we really intended here, should read instead of "activities" something like, "in order to finance settlement and payment of approved claims," which is really what we had in mind there.

Then subsection G has to do with the uses for which moneys in the fund may be put, first, to pay approved claims under indemnity contracts and reinsurance agreements, and other expenses incurred under this section; and, second, to reimburse or repay the borrowings from the Treasury.

Subsection H provides that the Commission may determine the character of and necessity for its obligations and expenditures and the manner in which they should be incurred, allowed, and paid, subject to the provisions of law specifically applicable to Government corporations.

This, we understand, is a rather standard provision in legislation on Government insurance. It has to do largely with our accounting. In effect, it says we set this up as we would an ordinary business enterprise.

Senator ANDERSON. This is that Butler-Byrd provision that went through some years ago that involved the Commodity Credit Corporation and various agencies of that nature then?

Mr. MITCHELL. I believe so; yes, sir.

Subsection I is another aspect of the same thing.

Subsection J has to do with the impact of section 53 (e) (8) of the present law, which, you will remember, requires a licensee of special nuclear material to hold the Government harmless, and in the area where the Government is issuing indemnity or reinsurance agreements, obviously this should not apply; but we are excepting it only to the extent that indemnity or reinsurance agreements do exist.

Chairman ANDERSON. Would you mind going back and relating that again? The section says:

> The licensee shall hold the United States and the Commission harmless from damages resulting from the use or possession of special nuclear material by the licensee.

What does this do with that?

Mr. MITCHELL. This says that that section shall not apply to the extent that the Government issues indemnity agreements or reinsurance agreements to the licensee. Otherwise, you are going right around in a circle.

Chairman ANDERSON. All right.

Mr. MITCHELL. Subsection K requires the Commission, to the maximum extent practicable, to use the facilities and services of private insurance companies and of established insurance agents and brokers and established insurance adjustment organizations, and authorizes the Commission to make contracts with these organizations to pay a reasonable compensation for their services.

It further provides that upon a showing by the Commission that advertising is not reasonably practicable, these arrangements may be made by negotiation.

Chairman ANDERSON. Now will you tell us what they propose to do there?

Mr. MITCHELL. I think here the main use of this provision would be in the event that there were a loss and we wanted to use the services of the private organizations in settlement of claims.

Chairman ANDERSON. But the companies are going to take the first $65 million?

Mr. MITCHELL. Yes, sir.

Chairman ANDERSON. They will establish the overall limits of the loss. I would think that you would probably participate with them in the adjustment costs, but I do not know why you have to have an insurance agent sign a policy for this reinsurance.

Mr. MITCHELL. I do not know that we would, Mr. Chairman. I think, as you say, this would largely be in a situation where we did want to participate.

Chairman ANDERSON. Let us take the established insurance adjustment organization separately, and tell me why you want to use the private insurance companies and the established insurance agents and pay them for it when you are making it possible for them to get business? After all, they would not be able to write it if you did not reinsure it.

Mr. MITCHELL. I do not think this was so much in the context of reinsurance, Mr. Chairman.

Chairman ANDERSON. You can call it what you want.

Mr. MITCHELL. This is in the area of indemnity agreement.

Chairman ANDERSON. Your basic coverage insurance you are going to carry may go up to $65 million.

Mr. MITCHELL. Yes, sir.

Chairman ANDERSON. Above that there is a whole field, and you are taking the rest of the field and you are charging a small fee for that service. Why do you pay an insurance agent for it? What does he have to do with it? I happen to have an insurance agency, and I am generally in sympathy with this laudable effort to get them some money, just as they got a lot out of the war damage insurance and did not do a thing. But why do you do it?

Mr. MITCHELL. Our model for this, Mr. Chairman, was the flood-insurance bill which contained this identical provision.

Chairman ANDERSON. In the flood insurance bill you are protecting individual pieces of property where a firm may be the broker for that individual piece of property normally, and so forth, but I think in this, where you are covering a specific reactor being built under Government license, and the insurance company and insurance agent is getting a $65 million line of liability insurance, he ought to be happy. I do not think he needs to worry about collecting the last pound of flesh above that.

Mr. MITCHELL. You may well be right, sir.

Representative COLE. You do not need this language, anyway. You have it inherent in the act, to engage outside services.

Mr. MITCHELL. I think that is right.

Chairman ANDERSON. I think this provision that you can use to establish insurance adjustment organizations and pay proportionately with the other companies a reasonable amount for what you may be called up to pay is a wise provision. I think it would make a mess if you were going to go out and try to adjust these claims by the Government, but ordinarily, if there are 50 fire-insurance companies on a risk, they do not send 50 adjusters in. One adjuster service takes care of it, and that service bills the proportionate amount as to what they pay out.

I would think that on this one, since it is only to come into play in the extremely remote possibility that there would ever be a claim that would run beyond $65 million, you just get yourselves in lots of trouble.

Mr. MITCHELL. Certainly we do not want that, sir.

Chairman ANDERSON. I think you ought to plan to use the well-established adjustment facilities and pay for that. I do not think advertising is too practical. If you get a claim, you would have some adjusters that were around that thing the next morning, if not that afternoon, and you cannot stop that. All right.

Mr. MITCHELL. Subsection L has to do with the possibility that if there were a disaster and it proved necessary to acquire real estate in settlement of claims, the real estate in question would not go off the tax rolls as a result while the Government was holding it for disposition.

Chairman ANDERSON. There again I do not quite follow that in this type of insurance. Is this modeled after the flood control act again?

Mr. MITCHELL. Yes, sir.

Chairman ANDERSON. How would you get title to any real property here?

Mr. MITCHELL. I think it might be possible, Mr. Chairman. Let us take an agricultural area which is so seriously contaminated that its value is gone for a long period of years. It might be convenient for the Government simply to take it over and hold it. Maybe we might want to take some measure to try to decontaminate it; then, once we did so, dispose of it again.

Chairman ANDERSON. Or the example was given the other day about a building in Chicago, that a reactor might cause the walls of that to acquire a little contamination and it might take a good many years to clear it out or wash it down. Is that what you have in mind?

Mr. MITCHELL. That is possible; yes. We do not know that we would have to do this, but if we did, then it did not seem to be right to take the property off the tax rolls, because we happened to have it.

Chairman ANDERSON. That sounds sensible.

Mr. MITCHELL. The last subsection requires the Commission, not later than 1 year after the passage of the section, and annually thereafter, to submit to the President and to the Congress a report of its activities under the section, including any recommendations that it might deem advisable. I think we all recognize that this is something that will have to be continually reviewed, and this, of course, is over and above our ordinary requirements to keep this committee fully and currently informed. This is a more formal annual report in this particular area.

Chairman ANDERSON. Is there any provision here that would allow the Government to take over the defense in claims litigation? That is in Government contracts normally.

Mr. MITCHELL. Yes, sir.

Chairman ANDERSON. I just wondered; I am not quite sure, but it seems to me that the average reinsurance contract gives the reinsurer some right to come into the picture if he feels he is not being adequately represented. I know that I have had some occasions when the reinsurance people would say to me, "We think your judgment is bad. You want to go to trial and we do not want to." Or the other way around. It seems to me they have some rights.

Mr. MITCHELL. We certainly would think so, Mr. Chairman.

Chairman ANDERSON. There is not any language in here that would give the Government any rights.

Mr. MITCHELL. Yes, sir. Subsection D, the top of page 5, was the provision we had in mind in this respect, and we would contemplate that the agreements that we write would give us the right to review settlement of claims and to bring the Department of Justice in, in case of litigation, and things of this kind.

Chairman ANDERSON. I think it is necessary for the record that we get that sort of thing expressed clearly, because you do want that authority.

Mr. MITCHELL. Yes, sir; we certainly do.

Chairman ANDERSON. Do you have any feeling, Dr. Libby or Mr. Vance, that this ought to be simplified as much as possible? I think if you would treat this like an ordinary insurance operation, you are going to have a lot of problems. You are going to have to go to the risk and start setting up what the Government's liability can be under it, and a lot of other things, whereas, in reality, until you get a terrific claim, you are really never involved in it. I would hope that the Government would never hear of this again after Congress passed the bill, if it does pass the bill. I believe it never would.

Mr. VANCE. We hope and believe that this will be the situation. We think that this is simply a measure to satisfy that remote infinitesimal possibility that today seems to be one of the barriers in front of the program which we all desire in this today, of civilian application. It is my personal opinion that the Government will never have to pay a claim.

Chairman ANDERSON. It is my belief that that probably is true. That being true, it seems to me that we waste a lot of time if we start setting up liability sheets and going through all the formalities that an insurance company has to when it takes on a risk. That may be what is meant by the section dealing with private insurance companies, but I think if we start trying to evaluate how much the Government risk is on every reactor that is built, paying part of the cost of surveying it and so forth with the private insurance companies, we are going to be involved in endless grief, and they will be, too.

Mr. VANCE. It seems to me we should regard this whole thing as a temporary measure. We certainly do not want to put the Government into the insurance business permanently, and we feel that we have to do it temporarily, because the risks are so unknown.

I think that with the accumulation of some experience, we might find the opportunity to take the Government out of the insurance business again.

Chairman ANDERSON. I would hope so.

Mr. Cole.

Representative COLE. What influences or pressures are inherent in this concept that the Commission has, as reflected in the bill, which provides some restraint on the insurance carriers to the end that payments of claims will be not exorbitant or unduly generous, or devil-may-care, irrespective of liability?

Mr. MITCHELL. Mr. Cole, certainly within the area of what we might call normal expectable risk——

Representative COLE. This would happen only in those incidents where the aggregation of claims was in the neighborhood of $65 million. If it was substantially less, of course, the insurer is going to be very careful, but if they are somewhat over, then the insurer might say, "Well, they get the $65 million, and I will pay it all out, and first come, first served, and let Uncle Sam carry the rest of it."

Mr. MITCHELL. I would think if you are on the border so you did not know you are going to end up above or below $65 million, certainly the insurance companies would be seriously interested because they might end up with $60 million or $65 million. If you got the big aggregation of claims, in the event of that remote possibility, then it seems to me that the Government would have to step in at the outset, since we would not know initially what was involved, and we could not identify this particular claim against that one and say this is the insurance company's claim, and this one is ours. Presumably we would be in on all of them.

Representative COLE. Is there anything in your procedures that provides that that be the case?

Mr. MITCHELL. I think we would probably write our agreements to this effect, the very thing that we mentioned earlier, that we would reserve the right to review claims and participate in litigation in things of this kind.

Representative COLE. Would the private insurer be bound by the agreements of indemnity which you make with the operator?

Mr. MITCHELL. No, sir; I do not think they would, but, as I say, let us assume that you have an aggregate of claims of, say, $300 million that would be presented in different courts at different times, but they arise out of the accident. It seems to me there that we would properly say we are interested in all of those.

Representative COLE. I know you say so, but how are you going to be in a position to make anybody listen to you? I do not see how you can write it into the contract of indemnity, because the one subject to claims is not the operator; it is the insurer, the carrier.

Mr. MITCHELL. Maybe we ought to think about that a bit, sir.

Chairman ANDERSON. All right. Tomorrow morning at 10 o'clock we will resume.

(The information requested from the AEC, on p. 6 follows:)

REACTOR SAFETY AND INSURANCE FOR THE PRESSURIZED WATER REACTOR (PWR) PLANT AT SHIPPINGPORT, PA.

1. The subject is discussed below from four aspects:

(*a*) Who has responsibility for reactor safety.

(*b*) What is being done to make the PWR plant as safe as possible.

(*c*) What review and assistance is being obtained from outside groups such as the Commission's Advisory Committee on Reactor Safeguards, various national and State code committees, and national, State, and local public health organizations.

(*d*) What insurance and indemnification has been provided.

2. Responsibility for reactor safety:

(*a*) The reactor portion of the Shippingport plant is being designed and constructed and will be operated under Government contracts. The prime contract with the Westinghouse Electric Corp. for the design and construction of the plant and the construction subcontract with the Dravo Corp. provide that the contractor will take all reasonable precautions to protect health and safety and will comply with health and safety regulations and requirements prescribed by the Commission. The operating contract with Duquesne Light Co. contains a like provision with respect to the operation of the nuclear portion of the plant and further provides that in the design, construction, and operation of the turbine-generator portion of the plant the company will conform with Commission safety regulations pertaining to radiation matters and reactor operations.

(*b*) Major design decisions on the PWR reactor plant are submitted to the Commission for approval. Those having possible safety implications are singled out for separate review from a safety standpoint, both within the Commis-

sion and outside. Operating procedures and instruction books are also submitted for Commission review and approval.

3. To obtain as safe a plant as possible, the following steps are being taken:

(*a*) The Commission recognizes that plant safety and prevention of maloperation must be dealt with much more extensively in a nuclear plant than in a conventional powerplant. This course is dictated not only by lack of operating experience with nuclear powerplants as opposed to conventional powerplants and the possibility (however remote) of serious consequences of an accident, but it is realized that even a minor accident on a nuclear plant could have public repercussions far out of proportion to the physical damage which resulted. (It should be noted that the PWR, being a watercooled "slow neutron" reactor inherently cannot produce a serious nuclear explosion. The possible hazards result from casualties which could lead to release of some radioactivity from the plant.)

(*b*) Potential plant hazard are being analyzed and reviewed in considerably more detail for the PWR than for any conventional plant. The Stone & Webster Engineering Corp. plays an active part in this design evaluation as subcontractor to Westinghouse. Even conventional features of the plant are being scrutinized as part of this safety review.

(*c*) Throughout the design, conventional conservative engineering practice or better is being followed. Design shortcuts are being avoided.

(*d*) In addition, many special new techniques are being employed for inspection and testing of materials, components, and systems.

(*e*) Considerable care is being taken in training of operating personnel and in writing and review of operating procedures and instruction books in order to further decrease the possibility of maloperation.

(*f*) The preoperational test program for the plant is designed to show up any unexpected characteristics of the plant or its components so that any necessary changes in equipment or procedures can be made prior to power operation.

(*g*) Data on the natural radioactivity in the air, river, well water, and soil in the regions surrounding the Shippingport site are being systematically recorded. (See Annex A.)

(*h*) Standard accepted tolerances publicly promulgated in the National Bureau of Standards handbooks for radiation levels and radioactivity concentrations in plant wastes are being used; whenever more than one interpretation is possible, the most conservative is being used.

4. The following steps are being taken to insure adequate review of the PWR design and operating procedures:

(*a*) The Commission has an Advisory Committee for Reactor Safeguards consisting of 13 specialists in the various fields appropriate to the study of reactor safety. These include such diverse specialties as nuclear physics, pressure vessel and boiler technology, meteorology, radiology, etc. This committee reviews the design and operating procedures for each proposed reactor and advises the Commission's General Manager as to the safety aspects. This committee has been kept informed of the technical developments of the PWR since the beginning of the project. The committee has advised that the Shippingport site is acceptable, the proposed conceptual design of the plant container appears satisfactory, and that it is well impressed with the progress being made in defining the behavior of the system.

(*b*) The industrial board of the Pennsylvania Department of Labor and Industry has been consulted by Westinghouse and the Commission from the beginning to insure that all major components in the PWR plant meet applicable codes of the American Society of Mechanical Engineers (ASME) and the State of Pennsylvania. The State recognizes the National ASME codes and will accept equipment constructed by qualified vendors who have valid certificates of authorization for use of ASME code symbols. All important PWR equipment has been designed to meet an existing code and is so registered with the State of Pennsylvania and the ASME.

(*c*) A survey was made by Stone & Webster of all pertinent steam plant casualties (e. g., pipe ruptures) on which information could be obtained, in order to determine their nature and extent, and to apply whatever lessons could be learned to the design of the PWR plant.

(*d*) The United States Public Health Service headquarters in Washington and the various appropriate State, regional, and local public health organizations have been consulted from time to time on problems of disposal of radioactive wastes from the PWR.

5. Insurance and indemnification:

(*a*) The Commission's contracts with the Duquesne Light Co. and with the Westinghouse Electric Corp. provide for Government indemnification of these companies against third-party liability. Pertinent excerpts from the Government's contract with the Duquesne Light Co. and the Westinghouse Electric Corp. are given in annex B and C, respectively.

(*b*) The contract with the Dravo Corp., the construction company for the PWR reactor plant, has a standard cost reimbursement article which provides for reimbursement of claims and judgments incurred in performing the work. The Dravo Corp. has no responsibility for the design or operation of the PWR reactor plant.

(*c*) No manufacturers or components or other subcontractors to Westinghouse or Duquesne have been granted any indemnification by the Government; it is understood that some of these subcontractors are currently discussing the subject with private insurance companies.

(*d*) It is understood that Duquesne intends to carry on the entire PWR plant all insurance normally carried on a conventional power station except for claims which could arise from radioactivity or nuclear causes for which the Government would indemnify Duquesne. Existing Duquesne insurance policies expected to be extended to the PWR plant include, but are not limited to, blanket fire with extended coverage, business interruption, machinery breakdown, comprehensive general liability, and blanket fidelity bond.

ANNEX A

COORDINATION WITH PUBLIC HEALTH ORGANIZATIONS

1. Public health organizations which have been consulted by the Commission on PWR radioactivity questions:

(*a*) United States Public Health Service Headquarters, Bethesda, Md.

(*b*) Pennsylvania Department of Health.

(*c*) Ohio River Valley Water Sanitation Commission, which has representatives from the departments of health of the States of—New York, Virginia, Pennsylvania, West Virginia, Ohio, Indiana, Illinois, Kentucky, and the Surgeon General of the United States Public Health Service or his designee.

(*d*) Robert A. Taft Sanitary Engineering Center, United States Public Health Service, Cincinnati, Ohio.

(*e*) AEC Division of Biology and Medicine; and through them, the National Committee on Radiation Protection.

2. Material being sampled for radioactivity in the vicinity of the PWR site (as a cooperative program among Westinghouse, Duquesne, and the Pennsylvania Department of Health):

(*a*) Soil samples over a 7-mile radius, beginning January 1956.

(*b*) Ohio River water at four locations near the PWR, beginning April 1956.

(*c*) River mud and plant life (algae) at these locations.

(*d*) Vegetation on land surrounding site, beginning May 1956.

(*e*) Well water within 1 mile of site, beginning July 1956.

A record of the natural radioactivity of these samples will be kept by Westinghouse, with copies sent to the Commission at Pittsburgh and Washington as a protection against false claims of radioactive contamination.

ANNEX B

EXCERPT FROM CONTRACT BETWEEN THE DUQUESNE LIGHT CO. AND THE UNITED STATES ATOMIC ENERGY COMMISSION

Contract Number AT(11-1)-292 dated November 3, 1954

ARTICLE XIII—INDEMNITY—INSURANCE

1. Indemnity Against Atomic Energy Hazards

The Government shall indemnify and hold the Company harmless against loss or damage (including personal injuries and deaths of persons whether employees of the Government, employees of the Company, or any other persons, and damage to property whether owned by the Government, the Company, or a third party), and any expense in connection therewith (including the expense of litigation)

not compensated by insurance or otherwise, of any kind or for any cause whatsoever (including negligence), arising out of radioactive, toxic, explosive, or other hazardous properties of source, special nuclear or radioactive materials, which the Company may use, possess or otherwise handle under or in connection with this contract, whether or not any director, officer, employee, or agent of the Company is responsible therefor, except that the Government shall have no obligation to indemnify the Company for such loss or damage caused by bad faith, wilful misconduct, or gross negligence on the part of some corporate officer or officers of the Company or on the part of any of its managers, superintendents, or equivalent representatives who have supervision or direction of all or substantially all of the operation of the nuclear plant.

2. Indemnity Against Other Hazards

For other than atomic energy hazards, the parties agree to the following indemnity provisions. The Government shall indemnify the Company against liability, loss, or damage arising out of the Company's work under this contract and resulting from claims of persons not a party to this contract (including personal injuries and deaths of persons whether employees of the Government, employees of the Company, or any other persons), caused by the negligence of Government employees and not compensated by insurance or otherwise. The Company shall indemnify the Government against loss or damage arising from claims of persons not a party to this contract (including personal injuries and deaths of persons whether employees of the Government, employees of the Company, or any other persons), caused by the negligence of Company employees and not compensated by insurance or otherwise. The foregoing notwithstanding, the Company shall assume all loss and damage to property owned by it and the Government shall assume all loss and damage to Government property regardless of whether such losses or damages are caused by the negligence of either a Company or a Government employee. However, the Government does not assume, and Company shall be responsible for, any loss or damage, including expenses incidental thereto, to Government property which results from wilful misconduct or lack of good faith on the part of any of the Company's directors or officers or on the part of any of its managers, superintendents, or other equivalent representatives who have supervision or direction of all or substantially all of the operation of the nuclear plant.

3. Litigation and Claims

(a) *Notice of Litigation or Claims.*—The Company shall give the Commission immediate notice in writing of any action or claim filed against the Company arising out of the performance of this contract.

(b) *Initiation, Defense and Settlement of Litigation and Claims.*—At the request of the Commission the Company shall defend litigation and claims involving the nuclear portion of the plant and any claim or litigation directly involving this contract or reimbursable thereunder, and, upon mutual agreement with the Commission, shall initiate litigation and claims arising in connection with it. Except as otherwise directed by the Commission in writing, the Company shall furnish immediately to the Commission copies of all pertinent papers received by the Company with respect to such action or claim. To the extent not in conflict with any applicable policy of insurance, the Company may, with the Commission's approval, settle any such action or claim, shall effect at the Commission's request an assignment and subrogation in favor of the Government of all Company rights and claims (except those against the Government), arising out of any such action or claim against the Company, and, if required by the Commission, shall authorize representatives of the Government to settle and defend any such action or claim and to represent the Company in, or to take charge of any such action. If the settlement or defense of an action or claim against the Company is undertaken by the Government, the Company shall furnish all reasonable assistance in effecting a settlement or asserting a defense. Where an action against the Company is not covered by a policy of insurance, the Company shall with the approval of the Commission proceed with the defense of the action in good faith, and in such event the defense of the action shall be at the expense of the Government; provided, however, that the Government shall not be liable for such expense to the extent that it would have been compensated for by insurance which was required by law or by the written direction of the Commission, but which the Company failed to secure through its own fault or negligence.

4. Insurance

When required by the Commission in writing, the Company at Government expense shall procure and maintain bonds and insurance in connection with the performance of work under this contract in such forms and in such amounts and for such periods of time as the Commission may approve. Except as may otherwise be approved by the Commission, such bonds and insurance policies shall exclude any claim on the part of the insurer or obligor to be subrogated, upon payment of a loss or otherwise, to any claim against the Government.

ANNEX C

EXCERPT FROM CONTRACT BETWEEN WESTINGHOUSE ELECTRIC CORPORATION AND THE U. S. ATOMIC ENERGY COMMISSION FOR ATOMIC ENERGY WORK

Contract Number AT-11-1-GEN-14 (as amended by Supplements 1 through 27)
Revision Number 4, January 18, 1956

ARTICLE XIV—CONTINGENCIES—LITIGATION AND CLAIMS—INSURANCE

1. It is agreed that all work under this contract is to be performed at the expense of the Government and that Westinghouse shall not be liable for and the Government shall indemnify and hold Westinghouse harmless against any delay, failure, loss or damage (including personal injuries and deaths and property damage), and any expenses in connection therewith (including expenses of litigation) not compensated by insurance or otherwise, sustained by Westinghouse arising out of or connected with the work, including, without limitation, claims by employees under any state or federal law relating to the compensation of employees and any loss or damage and incidental expense connected with any alleged liability for patent infringement or for breach of any obligation of Westinghouse existing at the effective date of this contract to grant patent rights to third parties. Except as may otherwise be agreed to by the parties, all payments for claims for loss or damage under this section shall be approved in advance by the Commission, and proper releases shall be obtained in all appropriate instances. Westinghouse and the Commission shall jointly develop procedures for handling all such claims.

2. Except as otherwise provided herein, Westinghouse shall initiate and defend litigation and claims arising out of or in connection with this contract and may settle such litigation or claims with the prior approval of the Commission. Westinghouse shall keep the Commission fully informed of the conduct of such proceedings including furnishing immediate notice of all actions and claims filed and all pertinent papers received or filed. Westinghouse also shall make appropriate assignments upon request of the Commission to enable the Government to protect its interests by litigation or otherwise. If required by the Commission in order to protect important interests of the Government, Westinghouse shall authorize representatives of the Government to settle or defend any such litigation or claims and to represent Westinghouse in, or take charge of, any such proceedings. In the handling of such claims or litigation by Westinghouse or the Government, each party shall obtain and receive the full collaboration of the other.

3. No obligations are imposed upon the Government by this Article where the Government shall establish that the delay, failure, loss, expense or damage sustained by Westinghouse or claimed against it was caused directly by bad faith or wilful misconduct on the part of some corporate officer or officers of Westinghouse, or on the part of any other representative having general supervision or direction of the work under this contract or on the part of the Manager of its Atomic Power Division.

4. The liability of the Government under this Article XIV shall not be subject to the dollar limitation under Article V, and shall survive completion of this contract, and termination of this contract as provided in Article XVI. To the extent that funds for payments by the Government under this article are not available to the Commission for purposes of this contract, such payments will be subject to the availability of funds from the Commission, Congress, or other sources.

5. When approved by the Commission in writing, Westinghouse shall procure and maintain bonds and insurance in such forms and in such amounts and for such periods of time as the Commission may require or approve. Such bonds and insurance policies shall, by appropriate language, exclude any claim on the part of the insurer or obligor to be subrogated, upon payment of a loss or otherwise, to any claim against the Government.

(Whereupon, at 4:30 p. m., Tuesday, May 15, 1956, the committee recessed, to reconvene at 10 a. m., Wednesday, May 16, 1956.)

GOVERNMENTAL INDEMNITY

WEDNESDAY, MAY 16, 1956

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee on Atomic Energy met at 10 a. m., pursuant to recess, in the House caucus room of the Capitol, Senator Clinton P. Anderson (chairman of the Joint Committee) presiding.

Present: Senators Anderson (presiding), Pastore, Jackson and Gore; and Representatives Price and Cole.

Present also: James T. Ramey, executive director, George Norris, Jr., George E. Brown, Jr., Wayne P. Brobeck, and David R. Toll, of the Joint Committee staff.

Chairman ANDERSON. The committee will be in order.

This morning we continue hearings on the proposed legislation on indemnity or insurance for reactor hazards. Yesterday we had representatives of the AEC explaining their legislative proposal on the matter of financial protection against reactor hazards, and providing supporting information on the nature of the hazards, possible extent of damage, and AEC safety measures to prevent accidents and related matters.

Today we begin testimony from representatives of the atomic power industry, the insurance industry, and other organizations and persons interested in the program.

I should like to emphasize that the hearings this week are intended to deal primarily with reactor hazard indemnity proposals, together with identifying other roadblocks in the program. It is not intended that these indemnity-insurance hearings will go into detail on the status of private reactor projects, or consider the broader problems of the acceleration of the civilian-reactor program.

The open hearings beginning next Wednesday, May 23, will go into greater detail into the roadblock problem, the status of reactor projects and consider proposals for acceleration of the civilian power program. I hope that all of those interested in this important subject will testify in those hearings.

Before beginning with our first witness today, I should like to set forth two questions on which I would like to get comments from the AEC for the record, and would be glad for comments from our forthcoming witnesses. The questions deal with the problem of determining the nature and extent of damage in the remote event of a reactor accident:

1. Wouldn't it be desirable for the law to direct AEC to make a survey after each reactor accident of any size, with the report to be made available to the injured, the claims people and the courts?

Recognizing that we are dealing with a somewhat still secret material, that may be of some importance.

2. Do we need to establish an ad hoc specialized claim settlement group whenever an accident occurs? Such people would be trained in atomic energy work and could consist of a representative of AEC, its contractors and insurance groups.

Both of these questions are based on the problem that it is difficult in many cases to establish proof of damage by radiation and toxicity. The private insurers and Government might have trouble with excessive claims if ordinary procedures were followed.

(The information supplied by the AEC follows:)

The suggestion posed in the first question is incorporated in section 170 (1) of S. 3929. The Commission has no objection to making such reports available to the public to the extent that the provisions of chapter 12 of the Atomic Energy Act of 1954 or any other law or executive order permit.

With respect to the second question, it is our understanding from the staff of the Joint Committee that Senator Anderson is no longer interested in the establishment of an ad hoc claims settlement group, and accordingly we are not commenting on that proposal.

Today for our first witness is Mr. H. R. Searing, chairman of the board of Consolidated Edison of New York.

We have been very happy to have your testimony in previous hearings, Mr. Searing, and I think you have been extremely helpful to this program by the attitude that you have taken. It is a pleasure to have you with us here today.

STATEMENT OF H. R. SEARING, CHAIRMAN OF THE BOARD, CONSOLIDATED EDISON COMPANY OF NEW YORK

Mr. SEARING. Thank you very much.

My name is H. R. Searing. I am chairman of the board of Consolidated Edison Company of New York, Inc. On March 22, 1955, Consolidated Edison applied to the Atomic Energy Commission for the necessary licenses—including a construction permit—for the construction and operation of an atomic reactor at Indian Point in Westchester County, N. Y.

One of the purposes of these hearings is to arrive at a solution of the insurance problems of reactor operation through legislation similar to that outlined by you, Mr. Chairman, in the letter announcing the hearings. I shall not undertake to comment on the details of the legislation, but the basic idea of assuring comprehensive protection by governmental action seems to be sound. We shall be glad to cooperate in any procedure Congress may establish, including the payment of charges to the Government for indemnification protection, if that is decided upon.

During the past year representatives of our company have said on several occasions that we were going to proceed with our program even if an immediate solution of the insurance problem was not forthcoming. My own thinking has been that a nuclear powerplant should be operated in a settled community only if we are quite confident that it will not be a hazard to the residents of the area. To me the question at issue is not so much whether the company that is operating a plant is subjecting its investors to a substantial financial risk, but rather whether it is subjecting thousands of people in the vicinity of

the plant to a serious hazard to life and health. If I thought that our plant constituted any such risk I would never have proposed to build it in the first place. If anything develops in the course of experimental work or plant design and construction that makes us think that it is unsafe to operate the plant, we will not operate it until we feel confident that it is safe to do so.

The particular type of reactor that my company plans to build is in many respects similar to the one under construction at Shippingport, although the fuel element design represents a definite advance, in the use of thorium. The reactor design has been carefully studied by our engineers; it has also been studied by a firm of consultants; it is being studied by the experts of the Commission. If a license to operate the plant is issued by the Commission I am sure that it will be issued only if the Commission is satisfied that the plant will not be a hazard to the surrounding area. I have no doubt that in going ahead with the Shippingport project the Commission was satisfied that it was safe to operate a reactor of the type that is being installed there, at a location not very far from heavily settled communities.

While I am confident that any reactor we operate will be operated safely, and I assume the same will be true of any reactor which the Commission approves for operation, nevertheless it cannot be said that there is no need for insurance. There is always the fear, however little substance it may have, that a serious accident may occur through some combination of almost inconceivable circumstances. If large numbers of the public believe that a serious accident may occur, this attitude must be considered whether or not it is based upon actual knowledge of reactor operation. Moreover, it seems clear that the absence of comprehensive insurance coverage is going to delay full-scale efforts by many companies in private industry. Without such coverage probably some of them would have difficulty in financing plants that they would like to build. The doubts that exist need to be resolved in order to encourage interested companies to go forward. These doubts cannot be resolved within the resources of the private insurance industry because we are talking about the kind of risk that is outside the bounds of reasonable probability and may be catastrophic in nature. To cover this special kind of risk insofar as it involves third-party liability, some kind of Government backing seems to be required. Legislation under which the Government would in effect agree to pay claims above those reasonably insurable would be welcome and would undoubtedly be a spur to progress. The alternative, advocated by some, of having the Government itself build and operate the reactors, of course would throw the entire cost of all claims, large and small, upon the Government as well as the cost of the reactor itself.

As I read the recent letter of the chairman of the committee, he is seeking further assurance that private industry is prepared to push ahead in this important field of development. I am sure it is. It is only too evident that with respect to conventional fuels we are confronted with vastly increased demands and steadily diminishing supplies. From an economy of abundance we shall presently pass to one of scarcity unless we are able to fill the gap by the development of these new and promising nuclear fuels. With such a prospect before it, industry may be depended upon to go forward with a constructive program that will meet our national requirements.

My own company is quite ready to do its part in preparing for the inevitable needs of the future, and I believe the project that it has undertaken will make a most valuable contribution. In our project we are seeking to make use of thorium, as well as uranium, thereby placing this alternative nuclear fuel on a basis of commercial use, and correspondingly broadening the entire horizon of nuclear power development. We have also planned to combine the use of nuclear fuels with conventional fuel in a manner that I am confident will show great economic advantage. In studying the preliminary plans for our plant I see everywhere a record of initiative and ingenuity, and I feel sure that the plant itself will presently be the most convincing evidence of the ability and willingness of private industry to forge ahead in this new field of technology.

When I first appeared before your committee last year I said that our aim was to buy a reactor in just the same way that we would purchase other equipment for our electric-generating facilities. The response of the manufacturers to our invitations for proposals showed that this was a sound approach and that they may be relied upon to furnish the necessary equipment.

I would like to tell you about the progress our company's program has already made and let you form your own judgment as to whether we are getting ahead satisfactorily. I believe that we are.

Preliminary engineering and design work in cooperation with our contractor, the Babcock & Wilcox Co., culminated, as you know, in the issuance on May 4, 1956, of a construction permit by the Commission. We had previously received, on July 7, 1955, an access permit from the Commission. We now have 55 individual security clearances under this permit. Our engineering vice president is supervising our reactor program as one of his major functions, and 50 people in our organization are working on its various aspects. I mentioned in my letter of February 14, 1956, to this committee that we had obtained expert analyses of hydrological, geological, and seismological conditions at the site, and that a study of meteorological conditions was underway. On December 20, 1955, we requested the Commission to advise us on reprocessing services and charges and prices for material, and stated our willingness to enter into contractual or other arrangements to cover these and related matters.

In the meantime our reactor contractor, Babcock & Wilcox, has assembled the specialized staff needed, a total of 85 people—50 on a full-time basis—who are working on our project. It has completed a facility in Lynchburg, Va., which is to be used to conduct experiments to prove out the design and safety features of our reactor. These experiments will get underway in the next 2 or 3 months. In preparation for them we have already received a license from the Commission for 20,500 kilograms of thorium metal to be used in these tests. Orders have been placed with the Commission facilities for the procurement of the thorium. There is now pending before the Commission an application for license for the enriched uranium needed for the critical experiment. This will also be ordered through the Commission. It is estimated that by the end of this year, either we, or Babcock & Wilcox for our account, will have obligated or expended a total amount of approximately $21 million for our reactor program.

We are not alarmed by the problems involved or the magnitude of

the effort, and we have not suffered from roadblocks in the way of our project. It is our experience that 3 years are required in our territory to bring a large conventioned power unit from authorization to operation. We set 5 years as an objective schedule for the nuclear plant in order to allow time for developmental work, including experimentation with the use of thorium in the fuel element. We think the schedule is a realistic one and we have every hope of meeting it. We are planning to present a detailed status report on our project at next week's hearings.

We welcome the proposed legislation on insurance and liability, but in moving ahead with our program we intend in any case carefully to observe the requirements of safety. As I see it, these requirements should be paramount no matter whether the reactors involved are Government-owned or privately owned. If they are neglected and a serious accident occurs as a result of unconsidered haste reactor development will be delayed for many years.

Chairman ANDERSON. Thank you, Mr. Searing. I am going to ask a few questions on your statement. On the first page of your statement, you said your company was going to proceed with the program even if the immediate solution of the insurance program is not forthcoming. You subsequently do state, on pages 2 and 3 that there is need for the Federal Government indemnity insurance in this field because the public and some companies have fears of a serious reactor accident. Do you think this could be overcome, Mr. Searing, in whole or in part, by vigorous comprehensive public educational program explaining reactor safety features and requirements and explaining the work that the AEC goes through in trying to make sure that these standards are high?

Mr. SEARING. We are doing it today in Westchester County. We feel that the public education is very vital.

Chairman ANDERSON. As a result of that public education program, have you experienced much of a problem in the fear on the part of the people living in that area that anything is going wrong?

Mr. SEARING. Not yet, and we hope we do not.

Chairman ANDERSON. I would think so, too. If there is no Government indemnity or insurance program, would you complete the construction and begin operations of your plant, do you believe?

Mr. SEARING. Our present thinking is this: We would complete the construction, we are set on that. But if, 4 years from now or whenever it is, if things are as confused and chaotic as they now are, I do not believe that we would load it. But we have not any intention of sitting on our hands for a minute as far as brains, mortar, and building equipment is concerned.

Chairman ANDERSON. Have you any idea what the insurance rates might be for this liability as yet?

Mr. SEARING. I have not a thought.

Chairman ANDERSON. Do you think that it would be—and I am asking this and you can say you think it is too early to talk about it if you do think so, without offending me in the slightest—do you think that we ought to know what those rates are when they are announced so that we can see whether they are available to the smaller users? I am thinking now, Mr. Searing, of what I mentioned yesterday. That is the Rural Electrification people. They have agreed to participate with REA up in Minnesota on a loan for a reactor, and I

think the Government part of it is to be about $6 million. They were going to advance it to this small cooperative for a small plant, probably the size of the Army plants.

That cooperative is very limited in its capital, by the very nature of a cooperative venture, and it does not have venture capital. They are going to try hard to get them a small plant. They would have difficulty buying insurance. We may be wanting to talk to them or other companies about the insurance program. Ordinarily if you get a special quotation of some kind from an insurance company, that is your own private business and the private business of the insurance company. Do you believe that in this instance there might be reasons to have public discussion of that?

Mr. SEARING. I do not think that my answer would mean very much. I have very limited experience there. But it seems to me that in Minnesota if they put it in the middle of Minneapolis, that is one thing, but if they went out in the wide open spaces, I should think it would be reflected in the rates. I think broadly, if insurance is going to cost twice as much as the fuel, the whole project is a dead duck and you might as well face it.

Chairman ANDERSON. You say on page 5 of your statement here that your company has requested the Commission to advise you on reprocessing services. Has the Commission indicated it will carry the main burden of reprocessing nuclear fuel used in your reactor?

Mr. SEARING. No; I cannot say that they have. I think broadly, the Commission would like to see it in the hands of somebody that we deal with directly as quickly as that may be. We have been told, for instance, that they would prefer us to buy our requirements of thorium directly from people in the thorium business.

Chairman ANDERSON. That raises a slight question with some of the people who are mining uranium ore. They have substantial quantities of thorium in connection with their uranium. At the present time AEC gives them nothing for their thorium. That is just thrown aside into a stockpile. You are going to be using it and would not thorium be something that should be paid for as well as uranium?

Mr. SEARING. I think the answer is obviously "yes."

Chairman ANDERSON. The operators of these mills will have it over at the side and will be paid nothing for it. We have just been having a discussion in the Judiciary Committee of the Senate over that very question, where the operators were operating to get vanadium and there was uranium in the tailings and the Government went in and bought the tailings and made uranium out of it in the 1942 period. I am just wondering if thorium is going to get in the same shape. It is not primarily your problem, of course.

Mr. SEARING. No, but getting to the main point of your question, we just do not know what the Commission is going to do with our letter, but I guess—and it is no more than that—that they would try to pass it on to the private contractor as quickly as possible. We would rather see it that way ourselves.

Chairman ANDERSON. Because there will be some firms here that will discuss this problem, I hope you will not mind if I just run through some of these other suggested roadblocks, and you tell me whether they are a roadblock in your program as yet.

Would relief from the Public Utility Holding Company Act be important?

Mr. SEARING. It does not affect us at all.

Chairman ANDERSON. It does not not affect you at all?

Mr. SEARING. No.

Chairman ANDERSON. How about income tax relief for capital expenditures in excess of the amount necessary for conventional facilities? Is that a problem to you?

Mr. SEARING. Not yet, and we have not thought of either that or rapid amortization.

Chairman ANDERSON. In some of the plants there has been this question of charging this experimental work or contributions to their reactor program as an expense. Is that a problem to you as yet?

Mr. SEARING. Not as yet.

Representative COLE. May I come back to the first one, why are you not concerned about the holding company law?

Mr. SEARING. We are not teamed up with anybody, we are entirely on our own.

Representative COLE. I thought that was the reason. If you were associated with some other similar organization, would you be concerned about it?

Mr. SEARING. I think we would be. It has not occurred to me.

Representative COLE. What I wanted to bring out is the fact that you are not concerned about it because you are operating alone.

Mr. SEARING. For instance, if we teamed up with a public service company of Jersey, across the State line, I think it would be one of the main factors we would have to consider first.

Representative COLE. On the question of the expense of your venture being used as treatment for tax purposes. That is not bothering you at the present time?

Mr. SEARING. Not at this time. We are anticipating the question you may have in mind. We have no thought of applying for rapid certificates, at this moment, or any writeoff of the experimental work.

Chairman ANDERSON. Was your company ever under the Holding Company Act?

Mr. SEARING. I think we are still under it.

Chairman ANDERSON. Is it now under it?

Mr. SEARING. We are operating under an exemption.

Chairman ANDERSON. I am not trying to say—and I want it clear—that it is improper, but there is a suggestion that there ought to be an exemption from the Public Holding Company Act. My question is directed to you because you are getting ready to build a plant. If you are not being stopped by it at the present time, it is not an immediate roadblock to your operations. Later on Commonwealth Edison may testify and it may be an immediate roadblock to their operations. Detroit Electric has taken in all sorts of partners who are not primarily in the electrical business, and I think it is a very good thing they have. But that may present some roadblocks to them. I am just trying to see where the roadblocks come, and why they come there.

Mr. SEARING. I am directing my remarks to Consolidated Edison rather than the industry.

Chairman ANDERSON. Is there any need for provision of the Government purchase of plutonium at subsidy prices?

Mr. SEARING. No.

Chairman ANDERSON. Is there a manpower shortage in connection with this as far as you are concerned?

Mr. SEARING. You mean technical manpower, particularly?

Chairman ANDERSON. Yes.

Mr. SEARING. I think it faces all of us everywhere, but it is really no worse on this front than others. As a matter of fact, we have less difficulty getting people to work on a romantic project like this than on some conventional operation.

Chairman ANDERSON. Is there any need for private ownership of fissionable materials as you see it as yet?

Mr. SEARING. No.

Representative COLE. What would be your total investment in this project?

Mr. SEARING. Based on the original estimates, $55 million, but by the time it is built I am quite sure it will be higher than that because of installation and material costs.

Representative COLE. What portion of that is atomic reactor cost?

Mr. SEARING. Guessing, within the limits of our discussion, about $18 million in 1955. That is the reactor and heat exchanger.

Representative COLE. It is about a third of the whole project, is assigned to the reactor. Are you also going to have conventional boilers?

Mr. SEARING. We are going to have a superheater. That is not conventional boilers. The reactor will furnish all of the basic steam.

Representative COLE. All of it?

Mr. SEARING. Yes, sir.

Representative COLE. So that you have indicated that you are not going to charge the reactor until you have a better understanding of the extent of your liability. That means that until this atmosphere is cleared in that respect, this investment of $60 million will be standing idle.

Mr. SEARING. If the great day comes and we are still where we are today, it would stand idle.

Representative COLE. I somehow have the notion that this was a dual type of generator, partly from atomic energy and partly from other fuels.

Mr. SEARING. It is dual in series rather than dual in parallel. You make the steam here, and you add some more energy to it with the superheater, but if you have not got the steam, the superheater does you no good at all.

Representative COLE. I see.

Chairman ANDERSON. Thank you very much, Mr. Searing. We are always glad to have you come back.

The next witness is Mr. Weaver, vice president of the Westinghouse Electric Corp. We are glad to have you here with us and we are glad to have your testimony on this subject this morning. Will you identify yourself for the record?

STATEMENT OF CHARLES H. WEAVER, VICE PRESIDENT OF WESTINGHOUSE ELECTRIC CORP.

Mr. WEAVER. My name is Charles H. Weaver, and I am vice president of the Westinghouse Electric Corp., responsible for that company's atomic power operations which embrace Government-sponsored reactor development work in our Bettis Atomic Power Divi-

sion which commenced in 1948, and an ever-growing number of Westinghouse-sponsored activities in Westinghouse facilities.

The latter include our atomic equipment department organized in 1952, our commercial atomic power activity formed early last year as an outgrowth of an industrial study group, the recently established atomic fuel department, and the Westinghouse testing reactor, which we expect to have operating next year.

In my prepared statement I shall not dwell on the accomplishments and the current efforts of these groups except as they relate to the third party liability problem.

Needless to say, though, we have attacked the reactor development problem broadly with enthusiasm, and we have assigned substantial Westinghouse funds to the program.

Since the Atomic Energy Act of 1954 many individuals and organizations have been searching for answers to problems related to financial protection against the risk of public liability arising from the operation of atomic reactors.

Your committee has been most respectful of these problems and the need for their solution, as has the Atomic Energy Commission.

Not only have individual organizations like my company been concerned with the risk, but extensive studies have been sponsored by, and carried on through activities of the Atomic Industrial Forum and the insurance industry. The problems have now come into much clearer focus, and it appears to be virtually unanimously agreed that a legislative solution to the public liability problem is necessary if one of the principal purposes of the act—

to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes—

is to be possible.

Without reviewing the detailed results of the various studies which have been made, it is apparent that operators of nuclear plants may be held liable for injuries caused by nuclear accidents, even if they have not been negligent.

It is also apparent that suppliers of components for nuclear plants may be held liable if the cause for a nuclear accident can be traced to the supplier.

My company will be an operator of a nuclear plant, a supplier of atomic-electric plants and a supplier of components for nuclear plants. Our operations, therefore, raise problems which are representative of the various segments of the industry.

We are building the Westinghouse testing reactor—a nuclear facility to test materials—at Waltz Mill, Pa., and plan to start operating the reactor in mid-1947. Although we have presented to the Atomic Energy Commission our best preliminary evaluation of the hazards and safety factors affecting the reactor, it will be necessarily some time before complete details can be worked out.

We, therefore, cannot be sure of the insurance programs which will be necessary or feasible when the reactor is operating. We do know that if the financial protection needed is not reasonably available, we will not be able to go ahead with the Westinghouse testing reactor.

Concerning this reactor, we are in virtually the same position on a smaller scale as our utility friends who will operate power reactors.

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We may be absolutely liable to the public should damage occur. Obviously, we cannot risk the financial stability of our company for a relatively small project no matter how important it is to the country's reactor development effort, if it could result in major liability in relation to our assets.

Users of our testing reactor, other than Westinghouse, might also be liable in the event that their samples or experiments should be indicated as the source of an accident.

As a supplier of atomic-electric plants, we necessarily share the concern of the electric utility companies as our agreements to furnish plants to them depend on their finding financial protection covering operation of the plants.

Although we know that the work we do and the equipment we supply is of the best, we must ask our customers to protect us against public liability arising from the use of the powerplants.

Through our commercial atomic power organization at East Pittsburgh, we are actively developing, in partnership with the Pennsylvania Power & Light Co., of Allentown, Pa., a homogeneous type reactor, having an electrical capacity of 150,000 kilowatts for planned completion in 1962.

Our agreement with the Pennsylvania Power & Light Co. recognizes that the third-party-liability program must be solved on a timely and satisfactory basis or the project will not go through to completion. This project is representative of others such as our work with the Yankee Atomic Electric Co., and in every case the third-party liability is a key question.

In this area we, of course, have two concerns. First, if our customers cannot find financial protection the plants will not be built. Second, if we, as the manufacturer of the plants cannot find financial protection, our existence as a manufacturer of nuclear plants will be jeopardized.

Our customers' alternative, if the problem cannot be overcome, is to stick with conventional powerplants. If they are forced to this alternative, Westinghouse management will have difficulty in justifying to its stockholders the substantial expenditure necessary to develop, design, and set up manufacturing facilities for nuclear plants which lack an evident market.

As you know, we are developing, designing, and building a 11,500 kilowatt pressurized water reactor for export to a syndicate of Belgian customers. This plant is scheduled to operate at the 1958 Brussels World's Fair. Here the third party liability most certainly has us in a quandary.

Although we are insisting that the Belgian syndicate agree to hold us harmless against any third party liability, we know of no insurance available to them even approaching that proposed for atomic operations by the American insurance industry.

Chairman ANDERSON. Could you tell us what the nature of the Belgian syndicate is? Is it a semigovernmental organization?

Mr. WEAVER. It is an organization of Belgian industry, Senator. There is not, to the best of my knowledge, any Government money in that syndicate.

Chairman ANDERSON. And it could thereby be devoid of capital itself?

Mr. WEAVER. That is right.

Chairman ANDERSON. If there was an accident and people over there, who felt themselves financially damaged either through loss of property or because of loss of life of some member of the family, brought suit there would be no assets there that they could attach and they would naturally fall back on somebody who had some.

Mr. WEAVER. The assets would certainly be expected to be limited. We have not determined to our satisfaction what they consider them to be yet, and in the event that they would not cover the accident they certainly could choose to sue the Westinghouse Co. as the supplier of the plant.

Chairman ANDERSON. You saw the bill which the Atomic Energy Commission, or heard about the bill, which the Atomic Energy Commission presented yesterday. Would it be your thought that that bill should be broadened enough to protect you in your operations worldwide?

Mr. WEAVER. Senator, I am not certain just how this can be accomplished. That is, whether it can be accomplished in the current legislation or whether it must be accomplished as a part of our agreements between governments.

Chairman ANDERSON. You have listed a problem here.

Mr. WEAVER. I list it as a problem here.

Chairman ANDERSON. How would the Government's assumption of liability above $65 million help you? Do you feel there is any right that this Government would have to protect you in your operations in Belgium?

Mr. WEAVER. No, we are not proposing that, Senator. We are stating it as a problem connected with the development and sale of nuclear powerplants. I thought that this committee would wish to know all of the areas in which we foresaw such problems.

Representative COLE. Recognizing it as a problem, do you not have any suggestions or solutions?

Mr. WEAVER. First of all, we must, I believe, work with the Belgians to see how far they can go. We have specifically presented the problem to them. We have asked for their assurances including Government action if that can be taken in Belgium over and above whatever private insurance might be available to them.

It is my feeling that perhaps the committee at a later date would wish to consider whether or not in entering into bilateral agreements with these countries, for power reactors, that this matter should be brought up at that time.

Representative COLE. If I may ask a question there, that was a subject of discussion when the subcommittee was considering a number of these bilateral agreements. I am certain that the early agreements did not carry any provision with respect to one government being saved harmless by the other government. However, since it was raised by the committee, I understand that provisions are now being inserted in certain bilateral agreements. If there are any staff members who can correct me, I would not want to create a false impression.

I understand that that is currently being considered. But that is only with respect to governments.

Mr. WEAVER. That is right.

Representative COLE. And it is not with respect to citizens of the respective countries.

Mr. WEAVER. We are awaiting word from the Belgians as to what their Government intends to do about this at the present time. My thought would be, if such a matter were covered by international agreement as part of the agreements of cooperation it would recognize the responsibility of the foreign government to handle this indemnification problem in a way similar to the manner in which this Government chooses to handle it.

Representative COLE. Is not the operation of atomic plants in Belgium under Government scrutiny?

Mr. WEAVER. Yes, sir.

Representative COLE. And supervision?

Mr. WEAVER. Yes, sir.

Representative COLE. It is inconceivable that there would be any government that will not maintain control over atomic energy operations within that country.

Mr. WEAVER. This is certainly, I think, to be expected.

Representative COLE. Therefore, in making these agreements, and of course Westinghouse cannot engage in foreign trade in the atomic field unless there is in existence a bilateral agreement, is that right?

Mr. WEAVER. That is right. The bilateral is necessary to start with, under our act.

Representative COLE. It would seem therefore that the logical place to correct this problem is in the bilateral agreements.

Mr. WEAVER. I feel this way.

Representative COLE. And the other government agrees not only to indemnify the United States Government but also to save harmless any United States industry or supplier.

Mr. WEAVER. Basically to protect their own public, that is what it would amount to.

Chairman ANDERSON. I raise this because I did not want the impression to go out that we not only were going to underwrite all of the risk of the United States, but this Government was going to underwrite them all over the world. It is not your suggestion that we should do that, is it?

Mr. WEAVER. No, not at all, Senator. It is merely to bring out all problems in connection with reactor development in this area of indemnification against third-party liability.

Unless some financial protection to back up our customers' indemnity becomes available, the risk of proceeding may be too great. If the conceivable liability exceeds the available assets of the syndicate, then the customer's hold-harmless agreement obviously requires more backing than any existing protection affords.

This problem, of course, will be a recurring one with foreign customers until some general solution is found. Failure to solve it could jeopardize the American position in supplying nuclear power to the free world.

In addition to being a supplier of nuclear plants, we are also a supplier of components for reactors through our atomic equipment department located near Cheswick, Pa. This department manufactures such components as special pumps, valves, and control equipment.

Through our atomic fuel department, also located at Cheswick, we will make and sell cores for nuclear reactors. Other Westinghouse

organizations at various locations will supply more conventional components for nuclear powerplants, such as steam generators, switchgear, motors, turbines, electric generators, and transformers.

Through these activities we might sell an item at a relatively small dollar cost to some other builder of a complete atomic-electric plant, in turn sold to a utility operator. If, in the use of the plant, a serious nuclear accident occurred and the cause could somehow be traced in part to the particular component, our company might conceivably be liable to the extent of many, many millions of dollars, far out of proportion to either the price of the component or even to our investment in the industry.

Again, we have the dual concern that failure of our customers to find financial protection will extinguish the market and if the market exists we must find financial protection to remain as a component supplier.

Another area of concern to my company is the Government-contract field. Our contracts covering the activities of our Bettis plant near Pittsburgh, the related installation near Large, Pa., and the naval reactor test facility in Idaho, all of which we operate exclusively for the Government, contain provisions concerning our third-party liability arising out of Government-sponsored work.

Our basic contract with the Commission provides for holding us harmless, and cost limitations of the contract do not apply, but payments are subject to the availability of funds.

Under Navy contracts, third-party liabilities are in effect merely allowable costs subject to the ceiling on estimated costs in the contract and would not extend to liabilities arising after performance. In any case, the clauses do certainly not contemplate the kind of liabilities which have given rise to these hearings.

As we move, however, in the direction of more normal contracting relations with the Atomic Energy Commission and the military departments, particularly in Westinghouse-owned facilities which are not operated for the Government, our concern about public liability more nearly approaches the concern in the commercial and private field.

It is one thing to obtain recognition of third-party liability costs under cost-type contracts, even though presumably limited in amount by other contract terms—it may be another thing to obtain indemnities from the Government on fixed-price contracts performed in our own commercial facilities.

This is particularly true as we move out of the research and development stage and into production. The Army, Navy, and Air Force are all engaged in nuclear projects, whether for package reactors, submarines and ships, or aircraft.

Although in at least some of these cases the potential third-party liability may be limited, it exists in all cases. If the Congress proves willing to protect the public against the hazards of commercial nuclear operations, it would seem only logical that full protection to the public should be extended against the hazards of any Government project.

Chairman ANDERSON. Do you think the bill suggested by the Atomic Energy Commission covers that phase of it or not?

Mr. WEAVER. I have not studied it in detail. I do not believe it mentions the military departments at all.

We therefore recommend that in any legislation full financial protection be afforded to Government contractors against third-party liabilities. In this connection it has been proposed that in commercial operations the financial protection afforded to the user of the nuclear plant also cover the manufacturer and suppliers.

Senator GORE. May I ask a question there. When you say that the Government assumed full third-party liability for Government contractors, do you mean beyond the point at which the contractors can secure insurance or de novo?

Mr. WEAVER. I believe you are referring specifically to my statement regarding our Atomic Energy Commission contracts of a cost-type.

Senator GORE. Yes.

Mr. WEAVER. We only insure our own operations to the extent that the Commission asks us to insure those. That does not involve any third-party liability relative to operation of the nuclear plants.

Senator GORE. My point was this: Do you mean to recommend that the Government assume all third-party risks, or that portion of risk unobtainable from private insurance concerns?

Mr. WEAVER. I am assuming now that the Government, if they are owning and operating a plant, whether it be in the Military Establishments or Atomic Energy Commission plants, have paid for that plant. Therefore, if the insurance was considered necessary, and it should be available, the costs of that insurance would be in the price of that plant; would it not? Then, beyond that, not knowing what the limitations are in private insurance, we are saying that the Government operation of a reactor should be subjected to the same protection of the public and indemnification against product liability on the part of the suppliers as a privately owned and operated plant. That is all we are saying.

Senator GORE. And that that be extended to a contract operator?

Mr. WEAVER. That is right.

Senator GORE. Thank you.

Mr. WEAVER. And Government contracts for the pieces that are supplied to that plant.

Under our Government contracts, we have no basis for extended protection to suppliers. In fact, it frequently has been the case that suppliers have been asked to indemnify us and the Government against third-party liabilities arising from the use of their equipment. We are, of course, concerned both as a supplier to other prime contractors and as a prime contractor ourselves.

We appreciate the efforts of private insurers who have come up with a pool of an unprecedented $65 million, but unfortunately, looking ahead for the next few years, we cannot conclude that a $65 million coverage alone will be sufficient.

Furthermore, at the present time, we have no basis of evaluating the full protection which will be needed, because, for example, we may be selling components for reactor types other than those which we ourselves develop and manufacture, and in such cases we are in less of a position to evaluate the ultimate risk from the particular reactor type.

Even in the case of reactors with which we are most familiar, we cannot absolutely exclude the possibility that a great enough fool aided

by a great enough conspiracy of circumstances, could bring about an accident exceeding available insurance.

The Texas City disaster, although it involved nothing atomic, produced damage to the extent of several hundred million dollars. Discussions of possible nuclear accidents have brought further figures of conceivable liability from nuclear accidents, both above and below this figure. We ourselves cannot assess any specific ceiling with respect to any particular project.

Chairman ANDERSON. Now, the final payment in the Texas City accident did not run several hundred million dollars. I do not remember, but it seemed to me they had some limitation in there as to that.

Mr. WEAVER. I understood it was in the neighborhood of 2 to 3 million dollars, but I could be wrong, Senator.

Chairman ANDERSON. I know the claims were up there. It does have some bearing on this. It seems to me, there was a provision that no claim should exceed a certain amount and we will look it up and get that information.

However, I am very glad you brought it up, because as I recall it, there was a resistance to the bill and finally, when a bill was put in, there was provision that it should not exceed certain amounts.

I think it was $25,000. We then scaled down many of the claims. There was an early story that one man was going to recover millions of dollars, and he was a man worth many hundreds of millions of dollars, and it did seem a little difficult perhaps to justify it. But it was scaled down, and I think it would be a very interesting thing to have, and we will try to get into the hearing a statement of the method of settlement at the end of your testimony in the Texas City case, because it illustrates two things.

It not only illustrates the ability, perhaps of the Government to scale some things down, but also illustrates the fact that unless there is adequate insurance or a definite provision for liability, the people who really suffer are the folks who do not have any chance to recover.

Mr. WEAVER. That is right.

Chairman ANDERSON. Person after person got no payment at all, because there was not a clear liability. That is the reason for some of the questions I have been asking here, as we have been going along, to make sure that the people who are financially damaged in their property or in their person have an opportunity to collect for that financial damage to the full extent of it.

I am glad you brought this one up.

Senator GORE. Since you mentioned the Texas disaster, it might be interesting to note that perhaps the most catastrophic explosion in all mankind's history other than atomic, was an explosion in Germany prior to World War I, which was also an ammonium nitrate explosion somewhat similar to the Texas disaster.

There were some 800 people killed there.

Mr. WEAVER. Fortunately, we do not seem to have too many examples of these catastrophes.

There is just not enough experience or enough knowledge of the state of the art to support specific dollar estimates of the worst that could happen.

We recommend immediate legislation in the third party liability area. We believe that for the present the purposes of the Atomic Energy Act can only be furthered by such legislation. Although we

expect that a portion of the insurance offered by private insurers will be used, the insurance industry has not been able as yet to offer specific mechanics of protecting operators, reactor builders, and suppliers down through the various tiers, or of suggesting methods of prorating costs and benefits among the various parties. The insurance industry has not even been able to suggest the rates to be paid.

Although no private atomic powerplant is operating today, contracts have been let and more will be let within the next few months so that actual production can get underway. For example, we have just finished negotiations for the purchase from one of our suppliers of a vital component for the nuclear system of one of our commercial products.

Our suppier was unwilling to go ahead with the contract unless we agreed to indemnify him against nuclear risks. We just could not assume that responsibility and the day of reckoning was postponed.

However, in order to get the supplier to go ahead with the work, we had to promise him to resolve the indemnity problem before delivery of the equipment, or, in the alternative, reimburse him for his costs. This is an example of the immediacy of the problem.

Senator GORE. You mean your contractor would not proceed with the contract unless you as the manufacturer would indemnify him against all liabilities as an operator of the instrument which you were to sell him?

Mr. WEAVER. To indemnify him against any third-party liability claims which might result from an accident in the overall plant which could be traced back to his product. He was supplying one piece of a nuclear plant. And he said, "I will not build that piece for you unless you will save me harmless from all third-party liability claims which might come back to me in the event of a catastrophic accident arising from operation of the overall plant."

Senator GORE. Now, would you mind advising the committee just how you think this bill or legislation by the Federal Government should operate in that particular instance?

Mr. WEAVER. Both the basic insurance provided by private insurers in the amount of $65 million or less, however the method is determined, plus the indemnification of the Federal Government, must certainly protect the operator of the plant as well as the suppliers of pieces to that plant. Now, the proposal of the insurance industry to date, as I understand it, is to have one amount of insurance which would be purchased for a project, a given plant. That insurance would cover the operator and the suppliers of equipment.

Senator GORE. Would both participate in the premium?

Mr. WEAVER. Presumably both would participate in the premiums or if the operator had held the supplier harmless, presumably the operator would pay all of the premiums. But there has never been any further identification of just how it would work. Certainly, both the private insurance and the Government indemnification must, to be effective, apply to operators and suppliers and protect all of them against this third-party liability problem.

Senator PASTORE. Could I interrupt for a question. What was this vital component part that was to be manufactured?

Chairman ANDERSON. You be sure this is not a classified answer.

Senator PASTORE. Is this a classified answer?

Mr. WEAVER. This is not a classified answer.

Senator PASTORE. I kind of thought so, and that is why I asked the question.

Mr. WEAVER. This is simply a mechanical component, a pressure vessel associated with the primary coolant loop.

Senator PASTORE. Are you saying this decision was predicated upon the fact that the manufacturer of a component part carries with it an absolute liability as to third parties?

Mr. WEAVER. Not necessarily.

Senator PASTORE. On the part of the supplier?

Mr. WEAVER. Not necessarily, but it is possible.

Senator PASTORE. Why would he want indemnification?

Mr. WEAVER. It is completely feasible that there could be this accident, and that the Belgians and in this case, I will tell you it was the Belgian reactor that was involved, and we are currently buying the pieces for it, and if the Belgians could not support the liability through their own funds and make a settlement, and the suits came over against us and possibly through us to one of our suppliers, and the responsibility was fixed, let us say, toward that reactor vessel as being the source of the accident, then this supplier could be liable.

Senator PASTORE. Is that not pretty farfetched? Now, let us follow that through backward. You are actually saying that the supplier of a component part of a reactor which is to be sold to a foreign government is apprehensive of a claim that might come to him from a citizen of that foreign government because of the component part that he supplied to you.

Mr. WEAVER. Yes.

Senator PASTORE. Well, were lawyers consulted on this as to liability?

Mr. WEAVER. Certainly he is liable or he could be liable to the point where the cost to him would exceed his assets.

Senator PASTORE. I am speaking now of responsibility, and not of the amount of damages.

Mr. WEAVER. Responsibility could conceivably be fixed with a given product, in a plant.

Senator PASTORE. Where did you get that advice?

Mr. WEAVER. Well, we would feel the same way.

Senator PASTORE. I am not criticizing you, but I want to get the source of all of this, because we can get ourselves in a rather farfetched situation here.

Chairman ANDERSON. Would not it be the case again, of *McPherson* v. *Buick?*

Mr. WEAVER. Yes, and we feel exactly the same way about a piece that we might supply to someone else's reactor plant that someone else would operate.

Senator PASTORE. Why cannot you obtain an agreement of the indemnification from the Government of Belgium? They want to buy this reactor. Why should not the indemnification come from them rather than the insurance be covered by the American taxpayer?

Mr. WEAVER. We are not asking for that, Senator. We were discussing this point a little earlier before you came in. I did not suggest in this statement the Belgian plant, because the same thing can be true of a domestic plant. As long as there is not adequate insurance coverage against third party lilabilities arising from this nuclear

accident we talk about, then we have the potential of the operator of the plan being liable, and the supplier of the plant being liable, and the supplier of a component of the plant being liable, if the accident is to the degree and of a nature that can be traced back to that supplier.

Chairman ANDERSON. Are you not supplying material to the Shippingport reactor?

Mr. WEAVER. We are supplying materials to the Shippingport reactor as one example.

Chairman ANDERSON. Would that not be a parallel situation?

Mr. WEAVER. That is a case in point. Of course, there is an overall contract with our company from the Atomic Energy Commission of a nature that would conceivably protect us. But it does not protect another supplier who is building something for us.

Senator PASTORE. You are saying here on page 9 of your statement, for example:

> We have just finished negotiations for the purchase from one of our suppliers of a vital component for the nuclear system of one of our commercial products—

and you are talking about the Belgian reactor?

Mr. WEAVER. That is right.

Senator PASTORE. And, "Our supplier was unwilling to go ahead with the contract unless we agreed to indemnify him against nuclear risks," and you are still talking about a Belgian reactor. "We just could not assume that responsibility," and you are still talking about that reactor, "And the day of reckoning was postponed," on that particular reactor.

> However, in order to get the supplier to go ahead with the work, we had to promise him to resolve the indemnity problem before delivery of the equipment.

Now, my question to you is how do you expect to resolve that?

Mr. WEAVER. Well, in the case of that problem we must resolve it with the Belgian Government.

Senator PASTORE. That is what I am getting at, and it has nothing to do with this bill.

Mr. WEAVER. I am sorry I identified this to the Belgian reactor, because this same set of circumstances could prevail with the Consolidated Edison plant and the Commonwealth Edison plant, and Detroit project, or any other project in this country. It is the same sort of circumstances which can prevail.

Senator GORE. I do not think you need to be sorry for identifying it because it points up both the domestic and international problems, and it serves well the purposes of this hearing.

Mr. WEAVER. Yes.

Senator PASTORE. That may be so. I do not want to get into a debate over this matter, but I hope that we are not considering here indemnification of reactors sold to foreign governments.

Mr. WEAVER. We are not, and we have so identified that, Senator, a little earlier in my statement.

Senator PASTORE. All right.

Mr. WEAVER. Senator Anderson brought up this point.

Chairman ANDERSON. I raised the same point, but I think it is very valuable to point out that this is a sort of thing that can happen as you begin to build reactors in this country. That is for us in this country. Therefore, while the Shippingport reactor is protected

under a special indemnity that was brought out in the testimony yesterday, under the 1954 law that might not be possible and you might not be able to receive that sort of an agreement from the Atomic Energy Commission, a hold-harmless agreement the next time.

Mr. WEAVER. That is right.

Chairman ANDERSON. Then you have a problem.

Mr. WEAVER. We would expect this supplier to take exactly the same attitude if this was a reactor plant that was going to be located here in Washington, D. C.

Senator GORE. Now, if this be true of a nonclassified mechanical part of a nuclear process as you describe this, then it would be true of a water pump or any mechanical device used in connection with a reactor.

Mr. WEAVER. Exactly.

Chairman ANDERSON. Will you proceed?

Mr. WEAVER. I state that this is an example of the immediacy of the problem. I hesitate at this time to take a categorical position on the methods which the committee should recommend to achieve the desired results. I certainly feel that the proposal recently suggested by the chairman of the committee is in the right direction.

My only question concerns the difficulty of determining a reasonable amount of third-party liability insurance and reasonableness of rates. Perhaps this hearing will more fully develop answers to these questions. I would suggest that if the answers to the reasonableness of the amounts and rates is not solved, some fixed limit of liability would have to be substituted. It is important that in determining reasonableness of insurance rates, rates be equated or should be considered in the light of insurance costs for conventional powerplants.

I see no objection to a minimum charge per reactor for the Government protection, assuming that it is recognized that such a charge is not intended to provide a pool for payment of claims and is sufficiently reasonable in amount so that it will not basically affect the economics of the reactor operations. I suggest that no ceiling be imposed on the total coverage.

In summary, we join in the conclusion that the third-party liability problem must be solved and for the present the only solution seems to lie in legislation. When asked for comments as to factors which adversely affect full development of commercial atomic power, I must necessarily indicate that the third-party liability problem is, in my opinion, not the principal problem, nor can the principal problem be solved as readily by legislation.

The No. 1 problem is still scientific and technical. For example, we still do not know very much about fuel materials. If we had inexpensive, high temperatures, noncorrosive nuclear fuel materials, themselves highly resistant to corrosion and radiation damage, many of our difficulties would disappear.

Research and development would be cheaper. Our shortage of qualified scientists and engineers would be less acute. We would certainly come closer to designs of atomic powerplants economically competitive with conventional plants. Furthermore, such fuels might go far toward resolving the insurance problem.

The insurance problem is only a symptom of the fundamental technical problem and the high cost of development. Shortage of scientists and engineers and the problems of plant economics are other im-

portant symptoms. Of all these symptoms, the insurance problem appears to be the only one which can be quickly resolved by the Congress.

Senator GORE. Could I ask a question there? I hope you do not object to these occasional questions in the course of your testimony.

Mr. WEAVER. No; that is fine, Senator.

Senator GORE. In the previous paragraph you have just made an arresting statement. You say that this insurance problem is but a symptom and not a major problem. The major problem, you said, was technical.

Mr. WEAVER. That is right.

Senator GORE. Important though this be and you point out it is the one thing which the Congress can solve perhaps by early legislation but it is nevertheless not one of the major problems which you face.

Mr. WEAVER. Senator, I believe I said that the third party liability problem was not, in my opinion, the principal problem. It is a very major problem. It is a major problem because there is no way around some of these other problems readily available, and it looms today as the symptom, and therefore, the problem which appears to stand in the way of getting on with this job, more so than any others.

Senator GORE. You did not mean then, by referring to it as a symptom that the problem was minor?

Mr. WEAVER. I did not mean it was a minor problem in any way. It is a major problem, but I said it is not the principal problem. Perhaps I should relate this to time. My thinking here is that we just have a lot of technical developmental problems ahead of us. I have stated that. If we knew the answers to all of these problems, and we knew a lot more about materials we are working with and all of these questions, technical questions, we would know a lot more I think, about the insurance problem as such.

Maybe it would not loom at that time as important as it is now. That is why in any consideration, I believe the committee is well advised to look at the period of the next few years. When I say "few," I do not know whether it is 5 or 10. But it is this period when we are all going to learn through getting some plants into operation, and developing the information from those plants which will more clearly identify our operating problems, such as insurance for the future.

Senator GORE. You intended to say then, if I correctly understand you, that although the insurance roadblock is now an important one, it is by no means to be compared with the technical difficulties of this program.

Mr. WEAVER. Yes, sir, in the sense that this is a problem that we can solve today. The others are going to require time, money, and people.

I do not expect any nuclear accidents with major consequences to take place. Yet I firmly believe that we have to recognize this and provide for the remote possibility. Unless free of this concern it is difficult to conceive of private industry contributing to research and development and all-out attacks upon the fundamental technical problems.

We appreciate this opportunity to appear before your committee and, of course, will be glad to lend such assistance to the committee's efforts as is deemed appropriate.

Chairman ANDERSON. Mr. Weaver, on page 10 of your statement you say:

I suggest no ceiling be imposed on the total coverage.

I have suggested that there be some sort of a ceiling because I think that ceilings on insurance policies sometimes play an important and worthwhile part. I just want to go back to this Texas City situation which you mentioned. Turning to this Preliminary Report of Financial Protection Against Atomic Hazards, which is a very fine study which came out of Columbia University for the Atomic Industrial Forum, I notice that they mentioned the Texas City situation on page 10. They said that there was a bill estimated to run about $300 million.

Now, there were three limitations put in the final act which is Public Law 378 of the 84th Congress, that no death claim should exceed $25,000, that no personal injury claim should exceed $25,000, and that no property loss should exceed $25,000.

Now, as a result of those three limitations, the total payment was $67 million by this Government.

Now, $67 million as it works out is somewhat comparable to the $65 million that the insurance companies, stock and mutual, have indicated is available. So, since you brought the subject up, it might be worth mentioning that the amount of coverage they are going to make available is equivalent to the total payments that the Government made in the Texas City disaster. It shows that it is a pretty realistic ceiling for claims we conceivably might have. Of course, additional claims could come in, and it is those additional claims that additional insurance on the part of the Government would address itself to.

Mr. WEAVER. My reason for making this suggestion was based again only on the unknowns relative to the amounts and it may not be feasible legislatively to proceed on the basis of not having any limit.

Chairman ANDERSON. But, Mr. Weaver, if you have a total overall top ceiling of $500 million in any one claim against the Government, you do not greatly disturb the budget situation.

Mr. WEAVER. That is right.

Chairman ANDERSON. The Government can pick up $500 million and not be too disturbed. But if the Government has an unknown claim that could run $5 billion or $10 billion, as some people have estimated might happen, then you do greatly disturb the budget. I am only trying to get something on that.

Mr. WEAVER. I recognize this, and I think that that point is very well taken.

Chairman ANDERSON. I am only trying to see if we cannot find something that will take care of the insurance needs and at the same time be able to be carried into law and not disturb anybody who is worried about the budget situation.

Senator PASTORE. May I interject at this point, Mr. Chairman, the thing that is bothering me at this point is this: Let us assume the underwriters assume $65 million. Let us assume that the Federal Government puts a ceiling on it of half a billion dollars. Let us assume that the damage is $1 billion. Who picks up the remainder of the check? Where does the responsibility fall then?

Chairman ANDERSON. The person that picks up the remainder of the check is the same person that picked it up in the Texas City disaster. It is private individuals to be sure. But if you leave the matter wide open, I think you are in some difficulty. I know that in crop insurance

they had to put some limitations on how much could be done, and in flood insurance, which we are just through with, we put some limitations on it.

Senator PASTORE. We are putting a limitation as to the liability of the Federal Government, but you cannot put a limitation on liability. Where you have damages that exceed the ceiling which is placed by the Federal Government, who becomes responsible then, and will private industry be willing to undertake that responsibility? That is the question I ask.

Chairman ANDERSON. If private industry is not satisfied with $500 million, it might end up being satisfied with nothing at all. I question whether you can pass through the Congress of the United States just a blank check that says we will take care of every reactor accident no matter what the claims may total.

People might come in and say, "But I know I got a whiff of this and I think it is going to affect the third, fourth, and fifth generations of my family."

You are dealing with an awful lot of things when you talk about possible genetics manifestations 100 years from now. That is the only reason I think that is important.

Senator PASTORE. May I ask Mr. Weaver this question: Assuming that the underwriters will undertake responsibility for coverage up to $65 million, and assuming that the Federal Government is willing to indemnify up to half a billion dollars, then will private industry feel that there is any roadblock in the proper progress and development of this program?

Mr. WEAVER. Senator, I would first like an interpretation of the proposal as Senator Anderson made it in his recent letter. When you stated the ceiling of $500 million, I believe you suggested—

with any damages over this sum to be handled by special legislation.

Senator PASTORE. Well, I would like clarification of that, too.

Chairman ANDERSON. Well, to begin with, what was in the letter was a suggestion which had been proposed in the committee staff and it was not necessarily a proposal of my own, and therefore probably I should not interpret it. But what would we do in the *Texas City* case? When we had exhausted the insurance we told Congress to take another look at it. The only proposal there was that we have to start and say that, "I do not anticipate there will ever be an atomic disaster that will call for the payment of more money than was paid out in the Texas City disaster." If there should be, I think that eight times more than the Texas City disaster would be sufficient coverage. Therefore, it is possible that $500 million is enough. If it developed that there was an accident and $500 million was not enough, then I think Congress ought to take another look at it because I do not think it is the purpose of Congress to try to bankrupt any of the industries that have tried to survive in this program.

Incidentally, if the industries did not have any money, you would make individual people pick up the tab. I think Congress would want to look at the specific circumstance that arose and say that this thing does call for some additional legislation on the part of the Federal Congress. The reason I have left it that way in my own thinking, also, was that if the Congress did that, it had a chance to meet that problem budgetwise. If the thing is wide open, however, it

always has an undetermined claim that could run into billions of dollars hanging over each individual year's budget.

Senator JACKSON. What you are saying, Mr. Chairman, is that when a claim gets over a certain amount, being a very high amount, it is something that Congress ought to handle on the specific basis.

Senator PASTORE. That is not my problem. If Congress in the inception will hold private industry harmless against eventual damage over and above $65 million, with the understanding that it will fix the amount at half a billion dollars but will look at it again, that is one question. The question I am asking is this: How do we set this responsibility over and above the ceiling? Who will be responsible under the law? Is it the Federal Government or private industry? I think that is an important question and it ought to be answered.

I am not opposed to looking at it again, I am talking about original responsibility as to the amount over the half billion dollars. Who will be accountable in the law, the Government or private industry?

Mr. WEAVER. Your statement is just why, of course, we suggested there be no ceiling. I cannot answer your question beyond that.

Chairman ANDERSON. I think the Congress, when it passes the law will reach that determination. I would hate to see the Government start out to assume that liability at the very beginning but it may be that a special situation would arise where it should.

I do not think that you deal with those things. All I know is that if I go to buy a reinsurance contract with the little company that I am identified with, I buy what I think I may be called upon to utilize. In my particular instance, it is a small company, and therefore $1 million reinsurance is sufficient. Perhaps $2 million reinsurance would be sufficient for certain things. I buy that much. I do not buy $100 million or $500 million, and therefore the problem does not arise of what happens if they use up the $2 million.

What you try to do is to protect against any possible contingency. It seems to me that if you go as much as $65 million from private insurance sources plus $500 million excess insurance from the Government of the United States, a total of $565 million, you would come pretty close to covering what might be a possible contingency.

Mr. Libby's testimony the other day indicated that $200 million on a 100,000-kilowatt plant might be the maximum or the worst possible set of circumstances. I think that I would agree with him. I think it is far beyond what might come.

You do not know, and you probably will want to talk about providing some more.

In suggesting $500 million, I was trying to see if we could not get some figure which would not frighten the country or the Congress to death and still solve the problem which the producers of parts face, and which the fabricator of the entire reactor faces, and which the operator of that reactor would eventually face once he puts it in operation.

Mr. Searing says he is going ahead and build this reactor. He will put millions and millions of dollars into it. I think that is fine. When he has it finished, if they have not solved this problem, he may not be able to put it in operation. I think that would be tragic. Therefore, if there is some step that can be taken that makes it possible to finish the reactor and put it in operation, even though it does not answer all of the questions, I think it would be desirable.

I do not say that there is a complete answer at all.

Senator PASTORE. My only observation to that is that this job must be done. Is the Government going to do it or is private industry? I am hoping we do not make it too tough for private industry to do it. That is how I feel about it.

Chairman ANDERSON. You raised the question on pages 6 and 7 of your statement, where you discussed the company's concern in the Government contract field, and you recommended that any legislation provide that financial protection be afforded to cover Government contractors against third-party liability.

For your information, the staff of the Joint Committee is at work on something of that nature to add to a draft bill which is in preparation or to the provisions of the bill submitted by the Atomic Energy Commission. That recommendation of the staff is going to be submitted to the Joint Committee for consideration when it takes up this whole problem.

Let me ask you this: Why were you willing to proceed to completion on the Navy and other Government contracts without solving this public liability question previously? Why do you now feel unwilling to proceed on these private contracts?

Mr. WEAVER. I suppose you just go along and learn an awful lot. We did not know much about the nuclear plants at all, and we did not know whether we would have a nuclear reactor in operation when we started off in this business.

Chairman ANDERSON. Then is your answer that Admiral Rickover just shoved you into it?

Mr. WEAVER. We just shoved along, and we got some answers, and with the answers came some more problems.

Chairman ANDERSON. We understand that. He came before our committee 2 or 3 times and shoved us along, too, and we are glad he did.

Mr. WEAVER. That is right.

Representative COLE. Mr. Chairman, I would like for the benefit of Mr. Weaver and others who might be interested, to have Senator Pastore explain what is the present status of the bilateral agreements with respect to liability of operation under it. This was discussed just before you came in.

Senator PASTORE. There was an implied agreement, as we understood it, that the United States Government would not be liable. Then we insisted that that clause be inserted in all future agreements, and that is our understanding now, with the State Department.

Representative COLE. The question arises as to whether that indemnity is available to protect American suppliers of atomic plants abroad.

Senator PASTORE. I should think so, yes.

Representative COLE. At any rate, it would be well to try to make sure that it does cover American suppliers.

Senator PASTORE. It is our understanding that it will be worked out in contracts with foreign governments, so that suppliers and the United States Government will not be responsible in any way. Once the reactor is taken over by the foreign government and operated by them, that will be the result.

Mr. WEAVER. The clause that is going into the new agreements for cooperation provides:

Some atomic energy materials which the Government of _____ may request the Commission to provide in accordance with this arrangement are harmful to persons and property unless handled and used carefully. After delivery of such materials to the Government of _____, the Government of _____ shall bear all responsibility, insofar as the Government of the United States is concerned, for the safe handling and use of such materials. With respect to any special nuclear materials or fuel elements which the Commission may, pursuant to this agreement lease to the Government of_____ or to any private individual or private organization under its jurisdiction, the Government of _____ shall indemnify and save harmless the Government of the United States against any and all liability (including third-party liability) from any cause whatsoever arising out of the production, or fabrication, the ownership, the lease, and the possession and use of such special nuclear materials or fuel elements after delivery by the Commission to the Government of _____ or to any authorized private individual or private organization under its jurisdiction.

With this clause in the agreement for cooperation, it should not prove difficult for any company supplying reactor material under contract to the foreign government in accordance with the authority granted in this agreement for cooperation to obtain a similar hold-harmless clause for its direct contribution.

Chairman ANDERSON. Thank you very much, Mr. Weaver.

Mr. Cisler is the next witness.

While they are distributing statements, Mr. Cisler, I want to assure you that we welcome you here and we are happy to have you come in and discuss the problems with us, and if we ask questions about your particular problem it is not that we are trying to single you out for some sort of discussion. We are only trying to find out what problems arise when you approach this from the standpoint that your company approach it as contrasted to the problems that arise when you approach it as Mr. Searing's company did. We are not trying to say that either approach is right or either approach is wrong. But you have problems that he does not have, particularly under the holding-company situation. We are therefore very happy to have you here for this presentation today.

STATEMENT OF WALKER L. CISLER, PRESIDENT OF POWER REACTOR DEVELOPMENT CO.; ACCOMPANIED BY EDWARD M. SPENCER, ASSISTANT TREASURER OF THE DETROIT EDISON CO.; AND EDWARD S. REID, JR., COUNSEL FOR POWER REACTOR DEVELOPMENT CO.

Mr. CISLER. Mr. Chairman and gentlemen of the committee, it is always a privilege to appear before this committee because I am sure that from these hearings there comes about very constructive results in the peaceful development of atomic energy.

My name is Walker L. Cisler, and I am president of Power Reactor Development Co. a nonprofit membership corporation formed on August 30, 1955, under the laws of the State of Michigan. Power Reactor Development Co., as you know, is now engaged in a project to build a fast neutron breeder reactor as a part of the Atomic Energy Commission's power demonstration reactor program. I have with me Mr. Edward M. Spencer, assistant treasurer of the Detroit Edison Co. who is advising Power Reactor Development Co. on plant insurance matters, and Mr. Edward S. Reid, Jr., counsel for Power Re-

actor Development Co. I want to thank you for this opportunity to appear before you and discuss the matter of insurance and liability protection for atomic powerplants.

In the proposal to the Atomic Energy Commission, submitted March 30, 1955, by our group, we stated that we would need to be reasonably sure of the ability to obtain adequate public liability protection. We did so because we believe that no one should construct and operate a facility of the kind in question without assurance that the public would be fully protected against all possible incidents. Certainly it is only proper that any organization proposing to spend $40 million on a project of any kind would want such assurance.

It is a basic principle of reactor design to provide "feel safe" protection against any contingency the most expert opinion can foresee. We have put a tremendous amount of effort into safety considerations, and believe the reactor we plan to build meets the test. These factors will be checked and demonstrated in detail in the preoperation testing of the reactor. We would not build or operate a reactor which we believe to be dangerous, yet we must realize that there is a remote possibility of serious incidents, or even a catastrophe, which we cannot conceive.

We have followed with interest the development of American resources for insuring atomic hazards since our proposal was submitted, and we now have confidence in the ability of these resources to provide physical damage and workmen's compensation protection in adequate amounts and at reasonable rates for projects such as we contemplate. Although loss-of-use insurance does not appear to be available in the near future, this should not be a major problem in the development stages of the reactor program. Many companies do not carry loss-of-use insurance for their conventional powerplants, and believe such insurance is not essential for atomic powerplants.

The most difficult matter facing the insurance industry is that of providing adequate public liability protection. According to press announcements of May 10, they have now marshaled the greatest coverage—currently estimated to be as much as $65 million—that has ever been assembled to apply to a single type of risk, and they appear to be making rapid progress in the solution of the difficult technicalities of rating and policy design. These limits for atomic power projects, we are told, are as great as is currently consistent with sound underwriting practice, keeping in mind the interests of all policyholders.

In our judgment, the liability protection now available, as just indicated, is adequate for most of the conditions we can visualize. The danger of catastrophes beyond our imagination still exists, however, and we sincerely believe that it is in the national interest to provide additional financial protection to the public against any such catastrophes, no matter how remote. Until such time as we have more experience in evaluating these potential hazards, this, in our minds, can be accomplished most reasonably by some form of Government catastrophe indemnity.

We believe that this step is necessary for several reasons, including the following:

1. Since the development of peaceful uses of the atom is clearly in the interest of all, the burden of a catastrophe in excess of the

financial resources of a licensee—including his insurance—should not fall on injured parties.

2. The lack of catastrophe liability protection will seriously affect the ability of private industry to finance its participation in the power demonstration reactor program.

In considering legislative means of providing catastrophe liability protection, we believe that there are several basic factors that should receive consideration.

1. There should either be no upper limit expressed, or, if such limit is deemed necessary, it should be a very high limit with some indication of the action that would follow if the limit should be exceeded.

2. Because of the potentially great extent of a catastrophe, and because of its exceedingly remote probability, it is not feasible to provide a fund for loss payments. Such protection has few of the attributes of insurance and should not be labeled insurance. It is, however, reasonable to consider a charge for the assumption of risk. Such charge would have to be somewhat arbitrary. However, consideration should be given to the best possible estimates of expectancy of loss and to any administrative expense. Since it is not feasible to use the proceeds of such a charge to provide for funding losses, consideration should be given to applying them to research aimed at decreasing the need for catastrophe liability protection.

3. In administering any Government indemnity program, consideration should be given to using, to the fullest extent possible, the existing facilities of the Atomic Energy Commission and the insurance industry. It would seem reasonable to have Government activities in this area under the direction of the Atomic Energy Commission, and to empower the Commission on the basis of reasonable cost to use the facilities of commercial insurance in the issuance and administration of contracts and in the investigation and settlement of claims.

4. The catastrophe liability protection should be closely integrated with the program of private insurance. In this area, particular attention should be given to the basic requirements for eligibility for the protection. If all applicants are not required to show evidence of the same degree of financial responsibility through evidence of private insurance or otherwise, then some rules should be established to clarify administration. Such rules might have to be somewhat arbitrary.

5. Since it is to be hoped that either technical development, or the development of greater commercial insurance capacity, or both, may in time make a program of Government catastrophe liability protection unnecessary, such a program should be subject to periodic congressional review.

We in our studies sincerely believe that the provisions of Government catastrophe liability protection along the lines outlined above, would materially accelerate the development of peaceful uses of the atom. The program outlined by Senator Anderson in his letter of April 25, 1956, seems to contain most of the considerations we have enumerated. We believe such a program can be developed into a satisfactory law which will meet the needs of industry.

Senator Anderson's telegram of April 30 inviting us to testify with respect to the insurance matter, also suggested that we include comments concerning other factors which are impeding the civilian reactor development program.

It is my impression that civilian reactor projects have not been unreasonably delayed, considering the exceedingly tough nature of the many problems involved. Reactor technology is not advanced, and it is necessary to begin with conceptions and ideas, rather than well developed and proven plans. You are all familiar with the time required to design and build a single military airplane. We are dealing with an equally difficult matter.

I would like to speak briefly about our own project in order to bear out my point. Our project is being carried out in these separate parts as follows:

1. Detailed design, construction, ownership, and operation of the reactor and its related facilities by Power Reactor Development Co., a nonprofit membership corporation, the objective of which is the development of reactors suitable for the generation of power on a commercially economic basis;

2. Basic research and development work by Atomic Power Development Associates, Inc., a nonprofit membership corporation dedicated to research and development work in the field of atomic power, and

3. Design of conventional steam turbine generator facilities to be built, owned, and operated by the Detroit Edison Co.

All of these activities are being carefully coordinated to bring about the desired final result.

In discussing the progress which we have made, I will speak of these three groups collectively, rather than attempt to detail the individual activities.

There has been considerable discussion before this and other committees of Congress concerning conditions which were made in our proposal to the Atomic Energy Commission with respect to the following matters:

1. The availability of adequate public liability protection, which I have just discussed.

2. Assurance that funds contributed to Power Reactor Development Co. by companies participating in the project would be a charge against income for research and developmental purposes and therefore are deductible from income before income taxes are computed.

3. Assurance that companies participating in this developmental project would not come under the Public Utility Holding Company Act by reason of participating in this project.

Business experience has demonstrated that these are matters vitally relating to maintaining the responsibility of management in any businesslike undertaking. Steps which need not be discussed here are being taken to resolve the second and third matters. I would like to comment, however, that any assumption that the money in question would necessarily be paid as taxes if it were not used for this project is completely without reason.

The important point is that none of these matters has been allowed to delay progress on the project itself. This I so testified before Senator Pastore and Senator Potter at a hearing of the Interstate and Foreign Commerce Committee on April 18. The project is being carried forward with as great diligence as if these factors had never been present.

Now let us look at the brighter and more constructive side of this situation. I have here for your inspection two scale models of our proposed breeder reactor powerplant. Some of you may have seen

one or both of them before. The smaller one, figure 1, is of the entire plant, including the steam-turbine generator. The larger one, figure 2, is the heart of the plant, the breeder reactor itself. We use these models continuously in our discussions of the plant and its design.

These two pictures are in the document before you.

These models represent the culmination of intensive research and development work that has been underway since late 1950. As of today, more than 85 skilled engineers, scientists, mathematicians, and others are engaged in this work in Detroit. Many others are similarly engaged by contractors working for us. Today more than $8 million has been spent in that effort; nearly $5 million more is to be spent during the remainder of the year 1956, and approximately the same amount in 1957.

In order to build these models, we had to develop the complete conceptual design of the entire plant, including all of the major components of the reactor and its related facilities. There was no blueprint to which we could go. Nothing like it has ever been designed or built before. We had to start from the ground up. It has been a long, difficult and somewhat tedious task and progress has not always been as rapid as we have wished.

It is important to say here, too, that this conceptual design has been discussed and studied in detail by the most competent authorities in the business. All are agreed that the design is fundamentally sound and that the reactor should work as intended if proper attention is given to the detailed design.

We are now engaged in studying and evaluationg each component in detail, to determine so far as is possible that they will function as intended. Only through this process can we be reasonably certain that the reactor has a reasonable chance of success.

These conditions must be faced by anyone undertaking a project of this kind. They account for the long time required to complete reactor projects in the past. They will be with anyone, private or governmental, who undertakes similar projects in the future.

We believe we are making good progress in this work. We are completing experiments pertaining to the reaction between sodium and water should they be accidentally mixed, and the action which results when sodium escapes into the atmosphere. These are but two of many important safety considerations. We have recently completed for test purposes the installation of a prototype steam generator such as we intend to use in the plant.

More important, we have ordered nearly all of the reactor components at a cost of about $2,500,000 for installation in a test facility where they will be subjected to conditions approximating those in the reactor when it is operating at its full capacity. The items include the reactor vessel, the rotating plug shield, the hold-down and control mechanisms, the fuel element handling crane, a full-sized liquid sodium pump, and many other parts of lesser importance. The test facility is expected to be in operation in about a year from now. After testing it is expected that these components, if acceptable, will be used in the reactor itself.

We are making progress in other areas, too. Last week we began the preliminary preparation of the plant site so that field construction can begin without delay. We have appointed an architect-engineer to prepare the working drawings and he is already at work. We

have selected the construction-engineer to do the field construction work and he is planning his program. We are hopeful that we can break ground early in August of this year—1 year from the date when our project proposal was approved by the Commission.

There are still too many unknowns remaining to be able to assure you definitely that this project can be completed in late 1959 or early 1960 as originally planned, but that is still our goal.

May I add that the conventional turbine-generator for that part of the plant is on order and on manufacturing schedule.

In closing, I would like to bring to your attention once more the very broad background of this project. At the present time 54 companies from 18 different States are participating in the Atomic Power Development Associates, Inc., and Power Reactor Development Co. activities. The power companies represent more than 40 percent of the total electric-power generating capacity in the United States. Thus, atomic experience and know-how is being made available to a very large part of our country through this one project. It is of still greater importance that whatever benefits may result will not in any case be limited to only those associated with the projects. The charters of Atomic Power Development Associates, Inc., and Power Reactor Development Co. explicitly set forth the public character of these activities. As a part of the Commission's power demonstration reactor program, Power Reactor Development Co. is committed to make all information available to anyone whom the Commission may direct. We have followed this policy in the past and we will continue to do so in the future.

We believe this is one of the most constructive projects undertaken anywhere in the world.

Chairman ANDERSON. Mr. Cisler, if you will refer to the second page of your statement, at the bottom of the page, you say the danger of catastrophies beyond our imaginations still exist. Did you hear or read Dr. Libby's testimony yesterday, placing the greatest conceivable loss at around $200 million or $300 million or maybe $400 million?

Mr. CISLER. I read some of his testimony as reported. I was not here, unfortunately.

Chairman ANDERSON. Your plant would develop about 100,000 kilowatts, and he said 100,000 kilowatts, the range as far as he could conceive it for the worst possible accident would be something between $200 million and $300 million.

Would you still feel that this ought to be an open-end commitment on the part of the Government?

Mr. CISLER. Well, Senator Anderson, we endeavored in this presentation to you to follow very closely, analyzing the situation as you had outlined in your communication. We have said that we would use commercial insurance sources to the maximum extent available, that we believed there should be public liability protection provided for by legislation, and if the limit were $300 million beyond that the situation would be taken care of by special legislation to meet a particular situation.

We hope that will never occur. We certainly are endeavoring in every way possible to design and construct the reactor and all of its components in the safest way possible, and that was the purpose of bringing this model to show you the really infinite care which is being

taken in designing and pretesting the component parts to give the greatest assurance of protection.

Chairman ANDERSON. You say that if there is a limit, it ought to be a very high limit. Would you give me an idea of what a very high limit would be in your opinion?

Mr. CISLER. I would believe that the figure of $500 million to $1 billion would be a very high limit. I would ask Mr. Spencer to comment on that because he has so much more knowledge of insurance matters than I have. He is very conversant with this, and he is chairman of the Atomic Industrial Forum Insurance Committee, and he has given a great deal of thought to this.

Mr. SPENCER. I would think, Senator Anderson, that the $500 million figure which was expressed in your letter of April 25 and also the provision that you suggested, or at least outlined in that letter of a limitation of liability at that point should be adequate to cover practically anything that is conceivable.

If anything happened beyond that, it is so exceedingly remote that I think that you could depend on whatever congressional action would be taken in that connection.

Chairman ANDERSON. Have you made any studies, in your group or any other group, as to what you think might be a maximum liability that could occur in an incident of this nature? I know there have been some studies made.

Mr. SPENCER. Studies are in progress, Senator, but they have not proceeded to the point where I think we could put an upper limit on liability. In such studies there are many things that lend themselves fairly well to analytical treatment, such things as meteorological conditions and things of that kind. On the other hand, there are some things that can only be in the category of judgments concerning what we do not know.

This is a very difficult area, and it is one where we do not have sufficient background to back those judgments up. Although there has been 75 years or more of reactor operations—that is reactor years—this is very small compared with the millions of unit years that are available to judge such things as fire insurance, or the other more common types of insurance.

In that area, I think that we are going to have to rely a great deal on judgment to take care of those factors in the early rating of insurance and in the decisions as to the type of probability that is involved.

Representative COLE. I am curious to know Mr. Spencer's formula in determining the 75 reactor years' experience.

Mr. SPENCER. I took that from the information which was released by the Atomic Energy Commission. I believe that 75 reactor years is roughly the figure that was released.

Representative COLE. Do you know how that was arrived at?

Mr. SPENCER. No, I do not.

Chairman ANDERSON. The AEC did issue a figure of some 600,000 hours of operation.

Mr. SPENCER. Yes, sir.

Chairman ANDERSON. I suppose you just divided that into years.

Mr. SPENCER. That is right.

Representative COLE. Does that mean that that includes all of the reactors that have ever been built, from the smallest to the largest?

Mr. SPENCER. As I understand it, it includes the reactors that have been built and operated but does not include such things as critical assemblies. Again, the only information we have had was the information published in Nucleonics late last year.

Chairman ANDERSON. I wanted to go to this part of your statement that deals with these additional suggestions you have made on the development of funds to the reactor program and the Public Holding Company Act. My question on that, Mr. Cisler, has been this: The proposal that was turned over or considered by Senator Pastore's committee was that—

> No company shall be deemed to be an electric utility company within the meaning of this section if its only connection with the generation and transmission or distribution of electric energy is the ownership or operation in whole or in part directly or indirectly of facilities for the production of heat from special nuclear material which heat is used directly or indirectly in the generation of electrical energy.

Now, that provides a permanent perpetual exemption for every company that generates nuclear energy. My question is, why not just repeal the Public Holding Company Act?

Mr. CISLER. Senator Anderson, it was not the intention in any way to repeal the Public Utility Holding Company Act. The purpose was to permit during this developmental period the grouping together of not only power systems but manufacturing organizations and the like. When I was before this committee before you asked that question and I said that we would consider that further and I later brought to you some revisions of the wording of that which placed a limit upon the exemption.

Chairman ANDERSON. I want to clear that up. What happened after I got your suggestion was that I referred it to a member of the staff to study and in the meantime the bill got introduced with the old language in it. I am not objecting to that at all, and it was perfectly proper for Senator Potter and Senator Pastore to introduce it. I am saying to you that if there is a desire to exempt companies such as your own from provisions of the Public Utility Holding Company Act during the period of construction of a research facility, then I can see a good deal of reason for it. But to say that because they built a research facility that for 1,000 years they shall be exempt from the Public Utility Holding Company Act seems to me unreasonable.

Mr. CISLER. Senator Anderson, we took your point very seriously. We went back and considered it and then I brought to you the revision of that that we believed would meet the points that you had made. I believe Mr. Cole, also, that you had a copy of that, and Senator Potter, also.

Representative COLE. Is that not the bill that I introduced? I think it is pending before this committee.

Chairman ANDERSON. Well, it is a peculiar problem, because the other bill pending before another committee in which we have confidence and which has gone ahead with the holding of hearings has been interested in that. I am hoping we can narrow this down a little because I think that if Senator Pastore's committee desired to report it out, this committee would problably not insist on trying to have jurisdiction in the matter at all. What you are after is relief from the

provisions. You have associated some other people with you who are primarily and fundamentally not in the public utility business.

Mr. CISLER. Yes, sir.

Chairman ANDERSON. You do not desire to have them put under the Public Utility Holding Company Act because of that association?

Mr. CISLER. Yes, sir.

Chairman ANDERSON. I think that that is a wholly proper objective. I am glad to say that publicly and on the record.

Mr. CISLER. Thank you.

Chairman ANDERSON. But I do also think that there ought to be provision that this exemption from the Public Utility Holding Company Act only applies to the experimental work and does not apply once you start turning nuclear energy into ordinary commercial channels.

Mr. CISLER. It was the intention and purpose of this to get through this developmental period when we must mobilize skills and manpower and money to pay for this developmental work that must be done. I think that was made clear, Senator Pastore, in our testimony before your committee.

Chairman ANDERSON. Was it?

Senator PASTORE. Yes. As a matter of fact, I can say now with assurance, although I have not talked with Senator Potter who returned only yesterday, and I returned on yesterday, and we are in the process of winding up our hearings, and I think that there will be considerable refinement of the bill as originally introduced.

On this question of jurisdiction, I suppose that will have to be decided somewhere along the line. There is a question arising as to whether an amendment to the Public Utility Holding Company Act falls within the jurisdiction of the Interstate and Foreign Commerce Committee or the Joint Committee on Atomic Energy, because this has to do with nuclear power.

But insofar as section 4 of the proposed bill is concerned, I might say that there may be some refinement in placing this on a nonprofit basis as is predicated in your particular arrangement, and also on the score that it will extend only for that time where we have research and development.

As I understand it, the very spirit of your charter proposes to carry it no further than that.

Mr. CISLER. That is true.

Senator PASTORE. I think within those limitations, we will assist, if we can pass the bill, considerably in lifting this thing off the ground and getting it on its way. I want to assure the chairman that after all the bill is introduced and I am only a cosponsor. The bill was introduced by Senator Potter, and I think this is the second time it was introduced. We felt that it was time that we held hearings on it and those hearings are rather complete. We have heard from many interested parties, and we have several more to hear from.

I assure the chairman of this committee, Senator Anderson, that there will be considerable refinement as far as I am able to gather as of this moment, along the lines of which he has already spoken. We are all in accord and all assistance possible should be given in this case in order to develop the research in the use of nuclear energy for the production of power.

On the other hand, we should not create any of the monstrosities that the original Public Utility Holding Company Act actually eliminated. There is no purpose on anybody's part to do that, and I can give the chairman that assurance, that that is what is proposed.

Mr. CISLER. That is why I brought back to you, Senator Anderson, a revision of that that would seem to meet your points.

Senator PASTORE. I want to add further here that I do not know whether the chairman or Mr. Cisler is familiar with it, but I think the chairman is because he was on the floor at a time a colloquy was had between myself and Senator Gore, and then it was joined in by Senator Potter and Senator Potter did say publicly that he went along the lines of the suggestions that I have just outlined.

We all seemed to be thinking along the same lines.

When you get to section 5 of that bill, that is a horse of a different color. There I am afraid that some are going to be somewhat disappointed at what the committee is going to do.

Chairman ANDERSON. I was going to ask you about these other roadblocks, but I think that we have covered it enough in your testimony. The question of the use of funds for this type of reactor being chargeable to expense. I think would be simplified again if we pin it right down to reactors used only for research and experimental purposes. We recognize that every company spends money for research and it is properly an expense charge. If, however, you are building a capital facility that is going to be used later on, you do not ordinarily charge the construction of a factory to expense. Therefore, I think there needs to be some differentiation between what is going to take place in this particular instance and the regular case.

Mr. CISLER. The purpose here was simply to put into the research and development expense account the moneys spent for research and development purposes.

Chairman ANDERSON. But the 100,000 kilowatt reactor that is going to be supplying current, that is going to be sold to customers, is not completely a research project.

Mr. CISLER. It is a research and development project which is noneconomic.

Chairman ANDERSON. Well, Du Pont spends millions of dollars on research and you could call the noneconomic. That is all right. But if they build a building for research, they cannot charge that to expense, as I understand the law. I do not believe that General Motors' research centers are chargeable to expense, but I think that they have to be put in the capital account and depreciated.

Mr. CISLER. May I explain that the Power Reactor Development Co., being a nonprofit corporation, does not have a capital account. It is a developmental reactor. The conventional part of the plant, the part of the plant owned by the Detroit Edison Co., and I explained a little earlier that even the turbine generator for that plant is on order and in the manufacturing schedule, that is a capital expenditure and it is charged to the capital account.

But the moneys going into the development expense of that reactor are charged to the research account, and by direction of the Michigan Public Service Commission charged to that account as an expense item, charged against income.

Chairman ANDERSON. But the Michigan Public Service Commission does not have jurisdiction over the Bureau of Internal Revenue.

Mr. CISLER. Oh, no. I am just saying that in the accounting of our money, that is done.

Senator PASTORE. At that point, may I interrupt, Mr. Chairman. Has a rule been sought from the Internal Revenue as to whether or not you need a law?

Mr. CISLER. We have a request before the Internal Revenue Department, and we are very hopeful that that will be favorably acted upon.

Senator PASTORE. Without the need of a law?

Mr. CISLER. We are not asking for anything in connection with the law on that.

Chairman ANDERSON. Mr. Searing is going to build a plant. His plant will be expensive, running to millions and millions of dollars and be somewhat experimental. However, if it is successful, it will develop current. Would you be willing to concede then that if this treatment is given to your company, that he should be allowed to write off the entire cost of his reactor?

Mr. CISLER. I think it is a different situation, Senator Anderson. In this case we have some 26 companies involved in bearing the developmental cost of this.

Chairman ANDERSON. That is like saying because there are 50 stockholders in one company, and 500 stockholders in another, it is a different tax treatment.

Mr. CISLER. No; I think if there is tax treatment it is dealt with exactly in the same way.

Chairman ANDERSON. Therefore, you would concede that whatever tax treatment is given to your company in this reactor project should be given to Mr. Searing's company?

Mr. CISLER. And to everyone else.

Chairman ANDERSON. And to everybody else?

Mr. CISLER. We are asking for no different treatment.

Chairman ANDERSON. How would you carry that to a company that is not necessarily in the atomic energy business but it is in the Chemical business? Do you think they should write off plants that they build for the production of a new chemical, or a new fabric such as rayon?

Mr. CISLER. That, Senator Anderson, is outside of my field of experience.

Senator PASTORE. I think that there is this to be brought out. I hope I do not get in this debate because my philosophy is generally known, but you have got to consider here that here is the development of an art where the best minds in this field at the present time know that there will not be a competitive cost between the use of conventional fuels and nuclear energy for a long time to come. So at best this could be money down a rat hole unless some kind of consideration and understanding is given. You are not experimenting here for a profit that is going to come to you today or tomorrow. When you get to that point, it may be 15 or 20 years from today, and not only that, we are in a field where we are being urged to get into it through the admonitions of the President and through the Atomic energy Commission.

Now, the big question here is, Do you want this job done or do you not want it done and what is the incentive going to be?

Mr. CISLER. And, Senator Pastore, I would ask that it be kept in mind that this certainly is an advanced type of reactor, and it is a

breeder reactor, and to the best of my knowledge it is the largest breeder reactor project in existence.

Senator PASTORE. Let me ask you this question: If you knew that upon the completion of this reactor you would be able to produce electric power by nuclear energy as cheap as you can do it by the use of coal and oil, would you be asking for the concession?

Mr. CISLER. No, we would not. And we hope that we are coming to that in a matter of a few years when we can entirely on our own go about building a breeder reactor.

Senator PASTORE. There, I think, lies the crux of the whole matter. If you understand it, then we are on the way, and if you do not understand it, I am afraid we are lost in the woods.

Chairman ANDERSON. Finally, are reprocessing facilities and prices any roadblock?

Mr. CISLER. No. Senator Anderson, we are negotiating the contract with the Atomic Energy Commission and we believe that is near its final form and we are very hopeful that that will prove satisfactory to both the AEC and to the Power Reactor Development Co. It is not a roadblock.

Chairman ANDERSON. Let me say again that the session this afternoon will be in P–63, the old Supreme Court room in the Capitol, and tomorrow's sessions as well, both morning and afternoon, will be in P–63 of the Capitol. They are not definite yet as to what the room will be for Friday's session.

(Whereupon, at 12:20 p. m., a recess was taken until 2 p. m., of this same day.)

AFTERNOON SESSION

Representative PRICE (presiding). The committee will be in order.

This is a continuation of the hearings to receive testimony on the proposed legislation for governmental indemnity insurance to supplement private insurance covering reactor hazards to the public.

The first witness this afternoon will be Mr. Ray L. Schacht, general manager, Consumers Public Power District of Columbus, Nebr.

Will you come around, Mr. Schacht?

I see you have a prepared statement. Would you proceed with your statement after identifying yourself?

STATEMENT OF R. L. SCHACHT, GENERAL MANAGER, CONSUMERS PUBLIC POWER DISTRICT, COLUMBUS, NEBR.

Mr. SCHACHT. Thank you.

My name is R. L. Schacht. I am the general manager of the Consumers Public Power District, a public corporation in Nebraska, with headquarters at Columbus, Nebr. The Consumers District has a contract under negotiation with the Atomic Energy Commission in connection with a 75,000-kilowatt powerplant using a sodium graphite reactor (SGR) as a source of heat. It is proposed to locate this plant near Hallam, Nebr., a small community approximately 20 miles south of Lincoln, Nebr., the second largest city in the State. The site has been acquired and preliminary studies completed as to its adequacy.

I appreciate the opportunty to appear before this joint Committee on Atomic Energy, as from the earliest stages of our studies and negotiations, we have recognized that adequate insurance at reasonable cost

could be a major obstacle in construction and operation of power reactors by anyone other than the Federal Government. It was also apparent that the insurance industry was confronted with establishing coverages and rates for insurance on electric generating stations with new operating techniques, new types of hazards, and with more than the usual quota of unknown factors.

The matter of protection against accidents and failures in the nuclear portion of a plant looms as the largest obstacle to be overcome before Consumers District can understake the actual construction and operation of a nuclear powerplant.

In order to be as helpful as possible to the insurance industry in evaluating both our own installation and the overall field of power reactors, seven of the large insurance companies were invited to send representatives to an insurance seminar in Los Angeles in June 1955. Five accepted and sent technical men familiar with underwriting problems. The North American Aviation Co., who have done the development work on this sodium graphite reactor (SGR) prepared a very complete presentation of the design, construction and operating information of the plant.

Data were also presented on various types of failures, their probability, cost of repair and shutdown time. This was also followed by a field trip to inspect component testing and development work under way for both the SGR and its smaller counterpart, the SRE, or sodium reactor experiment, on which construction had started.

Except for 1 or 2 requests for supplemental data, which were promptly filled, we have had no indication that further information or work on our part or on the part of the North American Aviation Co. is needed by the insurance industry before establishing coverages and rates for our particular reactor.

In July 1955, letters were directed to the participating insurance companies requesting quotations on the following types of insurance in connection with the proposed SGR installations:

Fire and extended coverage
Reactor, boiler and machinery breakdown
Workemen's compensation
Public liability, bodily injury and property damage

To date, no definite information has been received from any of the five companies present at the seminar. Information has been received from another company on $1 million coverage (with $50,000 deductible) for public liability, workmen's compensation and contractual liability where loss or damage is due to the nuclear phases of the plant and its operation. However, this policy was not adequate for our situation and, consequently, would not solve our problem. The coverage is too low and the cost, quoted as $50,000 per year, is high—it alone being approximately double the entire insurance costs for us on a conventional plant of this size.

Although we do not anticipate any serious problem with workmen's compensation and fire and extended coverage, no rate quotations have been available to this date and our assumption may turn out to be nothing but wishful thinking. There may be exclusions inserted covering any loss or damage under these policies when due to nuclear causes.

Public liability and property damage insurance have received the major attention thus far, primarily because of the size of the dollar

coverages required, and this is as it should be. However, it should not be considered the sole insurance or protective problem of a serious nature.

In the reactor section of a nuclear plant there will be new types of equipment, with varying degrees of unproven performance. On some of the items, replacement, even with improved design, will not be of major concern from a cost standpoint. However, major equipment items such as the reactor vesels, the reactor core, heat exchangers, etc., could become damaged either through malfunctioning or just because the thermal, chemical, or metallurgical problem were not thoroughly understood and the original installation turned out to be deficient through no fault of the designer, constructor, or the operator.

The manufacturer's warranty, while of some value for a limited time, excludes consequential damages and falls far short of affording protection to the operator on replacement costs of a major nature which may total several million dollars. And in our case it would have the range of $5 million to $10 million. That is exclusive of the loss of a producing powerplant for many months.

These figures are much smaller than the third-party liability being discussed, but nevertheless are large items.

So far, we have no indication from the insurance industry that machinery breakdown insurance will be available to cover the new and novel portions of the plant, nor does it seem to be considered as a part of the Government's participation. However, in Consumers District's case, a satisfactory solution of this protection is just as essential a prerequisite to production with construction as adequate public liability at reasonable cost.

With regard to the legislative proposal contained in your chairman's letter as a basis for consideration and exploration during these hearings, I would like to make the following comments:

1. Government indemnity for public liability over and above the amount available from private insurance companies at reasonable costs with a ceiling of $500 million for any one disaster, appears to be adequate coverage from Consumers District's standpoint, for the operators, manufacturers, constructors, and individuals employed by them, particularly when coupled with provisions for special legislation for covering any one disaster in excess of this total amount.

However, I would suggest that the protection be not limited merely to public liability, but that the scope be expanded to cover damage to any property or persons where such damage occurs because of nuclear hazards or because of failure of experimental types of equipment and materials used in connection with peaceful uses of nuclear energy.

This protection should initially be available for a period of 15 years, which should allow adequate time for evaluation of hazards and afford the operators the coverage necessary. Provisions can be made for lesser periods for new applications as the hazards become more fully evaluated, and private insurance available at reasonable cost for increasing percentages of the coverages required.

The legislation should not designate any fixed amount of coverage required from private sources, as this will undoubtedly vary with the exposure of property and persons due to the location of the plant, and possibly with the type of reactor system and associated equipment used.

The Government should be prepared to provide full coverage if private insurance is not available at reasonable costs. The record is clear that the insurance problem must be solved if the reactor development program is to proceed along the lines it is presently taking. The decision has been made that reactor development should proceed, and the problem becomes largely one of how the costs are carried in order that the program can move forward. Without such a solution, the Government must carry the entire cost through its own construction and operation of these reactors.

If the decision was yet to be made as to whether or not to proceed with reactor development, the cost of insurance might become a determining factor in that decision.

In that latter statement perhaps I have assumed too much.

2. The proposal of limiting, by law, the liability of reactor operators and equipment manufacturers is satisfactory, considering the provisions of (1) above; however, I am not attempting to pass on the legal phases of such a limitation. I would not consider this a desirable approach if the limits of coverage would be reduced from those indicated, so as to leave the injured public the innocent victims of experimentation in reactor technology.

3. A charge made by the Government for insurance protection is proper; however, it should be held at a minimum in order to permit the maximum number of electric utilities possible to participate in the reactor development program. The higher the insurance costs, the more the program will be restricted to a few large utility combines with large financial resources, or to Federal construction and operation.

The use of moneys collected by the Government for research and development work on atomic safety is a splendid plan, so long as this is not to be the sole source of funds for this important work. The very problem we are struggling with today arises from insufficient experience and knowledge of various phases of atomic safety, indicating a need for much additional work along this line.

Representative PRICE. Does that complete your statement?

Mr. SCHACHT. Yes, sir.

I have a few comments that might be helpful, but if there are any questions, they might be developed in the questioning.

Representative PRICE. I wonder if you would like to comment on the proposal of the Atomic Energy Commission. Are you familiar with the proposal the Commission made?

Mr. SCHACHT. Yes.

Mr. CHAIRMAN.

Mr. Chairman, I sat in on part of the meeting yesterday when it was being discussed, although I have not had an opportunity to review it completely. I have the feeling that the $65 million coverage by private industry is not a proper key or almost a keystone to this entire program. And I have that feeling for several reasons.

One of them is it seems to imply that every utility operating a reactor, regardless of the size, the location, the type of reactor, is obligated to secure $65 million of coverage from the private insurance companies before they have any Government protection.

I don't believe it is practical at all to assume that a utility operator might be satisfied with $10 million and leave a gap between the $10 million and $65 million. This would be a very serious matter in case

this unexpected and unanticipated, but still possible, catastrophe might occur.

You either have to, it would seem to me, put all of these reactors into one straitjacket or you have to either vary the amount of coverage which you would secure from private sources before the Government indemnity takes over, or if you are not going to adjust the amount of coverage from the private insurance industry then the rate should be adjusted.

Representative COLE. I was going to ask that question. Do you not agree with the general conclusion that the rate for this $65 million coverage will be fixed for each particular reactor necessarily, and in fixing that rate it can be taken into consideration as to the likelihood of damage that might result from that particular reactor?

Mr. SCHACHT. If you can assume that will be done, I think then my objections to the $65 million figure disappear, because the thing that we feel is that a reactor of, say, 75,000 kilowatt capacity out in Nebraska with a population density of 10 persons per square mile, in a 15-mile radius, is quite a different type of risk than one up against one of the larger population centers further east.

Representative COLE. Mr. Haugh of the insurance industry is going to be the next witness. I hope in his discussion he will address his remarks to that point. You have an important aspect of this problem.

Mr. SCHACHT. I have the feeling, too, that the $65 million, the number we have been discussing, apparently, is a higher limit or a higher figure than should be considered as coverage from the private insurance industry at the present time.

I say that for this reason——

Representative COLE. I want you to say that over again because I did not understand what you meant.

Mr. SCHACHT. I feel that the $65 million coverage figure that is being discussed is too high a figure for the private insurance industry to go to, as the one at which Government indemnification starts.

I think that the Government indemnification should start at a much lower figure, and I feel that for this reason: We are used to insuring powerplants, conventional-type plants, with certain types of coverages. The testimony, I think, is clear, and it has been all through these hearings that I have attended and those where I read the testimony, that these reactors are going to be made as safe as humanly possible. There is no accident to be expected, but it cannot be dismissed as of yet wtih finality that there won't be one.

The Government, I feel, has been in the reactor insurance business for 10 years or more, whether you call it that or not. You have insured your own operations. You have had an excellent record. There obviously are no policies written, no premiums paid, but the record has been good.

I believe yesterday they were saying that the losses were practically negligible. If that insurance was on a type of retrospective plan, apparently, most of the premiums, with the exception of the administrative costs, would be returned because there has been no requirement for them.

Representative COLE. That is going to be reflected in the rate that each operator pays, is it not?

Mr. SCHACHT. Well, that could be.

I found myself in a very difficult situation coming to this hearing. Here legislation is being considered, or the matter is being considered, to move into legislation which is designed to get this whole reactor program moving. We have been attempting for the best part of a year to get some information—and maybe we have not approached it in the right way——

Representative COLE. What information have you been trying to get?

Mr. SCHACHT. On coverages, the amounts, the rates. And so far it just has not been available.

I am not criticizing the insurance people. They probably have not been able to develop it. But they are moving, I think, into a range where they are projecting their coverage out into, you might call it, the stratosphere where it is not really an insurance problem. They have said that over and over.

I would feel that if they would go back in their coverages to somewhere nearer the limits where the normal types of damages occur and let the Government, initially, at least, start indemnifying at these levels which are in the unknown, then we would develop a much better program.

You probably can appreciate that I am concerned that when the rates do become available they are going to be high and they are going to be quite a deterrent to organizations such as ours in going through with the atomic development.

Representative COLE. Do you have any feeling at all that the nature of your status as a cooperative or public district should justify a different rate for this coverage than a private corporation?

Mr. SCHACHT. No; I don't believe so. We are a public corporation, a public political division of the State of Nebraska. However, we can sue and be sued. We are subject to the same types of damage suits as the private corporations. So, I don't believe that we are contending that we should have some type of preferential treatment. One of the things I feel is that we, having no common stock as risk capital, may be a little more restricted in the extent to which we can go into these risks than some of the others.

Representative COLE. Is there any legal limitation on the risk that you might incur?

Mr. SCHACHT. No.

Representative COLE. As a public utility?

Mr. SCHACHT. No.

Representative COLE. Do you not have the tax resources available to cover any loss that results from risk?

Mr. SCHACHT. No; we do not. The public power districts in Nebraska have no power of taxation whatsoever. That is definitely prohibited. Our income must come from revenues and the operations of the business. We have no tax base at all.

Representative COLE. Assuming that a judgment is obtained against your public authority beyond the capacity of the authority to pay, what would be the recourse of the creditor? Or what would the power district do in order to liquidate the judgment?

Mr. SCHACHT. I suppose you would have, in effect, a bankrupt public power district. And, of course, that is part of the problem that we face.

I think you must recognize that organizations like ours cannot move into this development program without being able to see that our risks are covered. Otherwise we are playing with suicide. It is probably a form of Russian roulette. You are wondering whether that bullet is going to take effect or not. We just cannot do it.

Representative COLE. What do you mean when you speak of machinery breakdown insurance? Because I understood that was the kind of insurance we were talking about.

Mr. SCHACHT. No.

Representative COLE. What do you mean by machinery breakdown insurance?

Mr. SCHACHT. That is, Mr. Cole, the protection against the equipment in the plant that might break down, fly apart.

Chairman ANDERSON. Do you mean something similar to loss of use insurance?

Mr. SCHACHT. They go hand in hand.

Normally in a powerplant, if a turbine shaft breaks, as has happened, and you get heavy damage of equipment, or if you have a serious explosion in a boiler, that type of insurance protects against the damage to actual equipment that you have in your plant, other than a loss or damage caused by fire. It is a machinery breakdown type of thing.

Representative COLE. For the owner of the plant and the facility to protect himself against loss by reason of breakdown of machines.

Mr. SCHACHT. Yes.

Representative COLE. And to replace it and repair it.

Mr. SCHACHT. Yes; that is right. And, coupled with that, many times we carry a loss of use which means that during the period the plant is not able to produce any electricity you get some compensation, or reimbursement because of it.

Representative COLE. Has your inquiry with the insurance people indicated that what you call breakdown insurance is not available?

Mr. SCHACHT. We have no answers to indicate either way, Mr. Cole.

Representative COLE. Have you raised the question?

Mr. SCHACHT. Yes.

We come here in a rather difficult situation, because you are proposing legislation, as I started to say, to get this reactor program off the ground. I would presume that I would not be doing my full duty if I came here and merely indicated to you that public liability was the sole obstacle, and then we found out that after legislation was passed, next December, or shortly after the first of the year, we were ready to make commitments on our reactor and we were still blocked by this insurance problem.

I felt that I must point out to you that the problem, in our opinion, or from our standpoint, is broader than the third-party liability.

Representative COLE. Another point that you indicated was that the coverage should be extended to cover the public generally, including everybody, rather than certain persons.

Will you please develop that thought? Because that was again what I understood to be the coverage that we have been discussing, that the public generally would be covered by it.

Mr. SCHACHT. I am having a little trouble understanding that point, Congressman Cole. Would you repeat it? Maybe I can answer it.

Representative COLE. On page 5 you say:

I would suggest that the protection be not limited merely to public liability, but that the scope be expanded to cover damage to any property or persons where such damage occurs because of nuclear hazards * * *.

Mr. SCHACHT. In other words, it is probably another way of saying machinery and breakdown and some of the other things concerning our property; not only the property of third persons.

Chairman ANDERSON. Workmen's compensation would come within that field; would it not?

Mr. SCHACHT. Yes. Whatever phases of this whole program cannot be covered by the private insurance at reasonable costs. And I, in my own mind, feel that if the insurance companies could cover up to the level they normally cover with conventional plants, we would have a good starting point.

I am not an insurance man at all, but the way it seems to me, the premiums collected for insurance into these astronomical levels of coverage; are going to be unfair in that if there is a serious accident there obviously has not been enough money collected to cover the damage, and the insurance companies are going to have a serious financial loss, or if you don't have any accidents then there has been a high insurance cost saddled on the utility operator. And until the risk is better known I would feel that the insurance companies could well back down from these high coverages and leave that as a Government indemnity.

You have done it for 10 years in your own plant. You have had no reason to consider that you have any $500 million in obligations. Your record has been perfect.

Representative COLE. Is that your argument, then, that the Federal Government should assume the entire liability from $1 up?

Mr. SCHACHT. No. I felt that the legislation should not require starting the Federal indemnity at this high a figure. I thought it ought to be flexible enough so that it could be brought down. I would feel that the private insurance companies ought to provide coverages up to the level that they normally provide in conventional powerplants.

Chairman ANDERSON. Could you indicate what that level would be?

Mr. SCHACHT. I think it would vary with the powerplants, Senator Anderson.

Chairman ANDERSON. What I am trying to get at is this: If a man has a limited amount of financial resources behind him and becomes the owner of an automobile he may take public liability limits of, say, $20,000 and $50,000, that is, $20,000 to any 1 person and $50,000 in any 1 accident.

But if he is a man of substantial wealth he may carry $250,000 and $500,000.

Are you suggesting that the limit should be different for the respective financial resources of the various people, or because of the size of their plant against exposure?

Dr. Libby indicated there was a difference between a 7,500-kilowatt reactor running wild and a 100,000-kilowatt reactor running wild. Is that the measure that you put on it?

Mr. SCHACHT. Yes. I would feel that it ought to be keyed in with the insurance that is normally considered proper and adequate for a plant of the size you are building, a conventional plant or that size. A 75,000-kilowatt plant in our case.

Chairman ANDERSON. This is not normal. That is the trouble. You build an ordinary 10,000-kilowatt plant fired by oil or coal and you do not carry any unusual amount of insurance against its blowing up or running wild. But a nuclear powerplant has tremendous possibilities, even 7,500 kilowatts.

So saying that you put the normal limits on means that you might have a half-million-dollar-liability policy to be perfectly satisfied with it.

Mr. SCHACHT. Yes. I think that is a good illustration.

Chairman ANDERSON. Could you give us a little more definite idea, then, at what level you think it ought to be? Would you say it ought to be a million dollars?

You have been given a quotation, you say, here, on a million dollars that is going to cost $50,000 a year, or an indication that that might be the situation. Do you think the rate is too high and the coverage too low? Can you tell us what the rate might be and what the coverage ought to be in order to fit into a scheme of producing power that might be somewhat feasible?

Mr. SCHACHT. I wrote down that statement some weeks ago. I feel that if we are looking for coverages out of the private-insurance industry up in the $65-million range, and you pay $50,000 for $1 million coverage, I shudder a bit to think what type of a premium we might end up with $65 million coverage.

Representative COLE. Where did you get the suggestion that $50,000 would be the cost for $1 million protection?

Mr. SCHACHT. That was a figure given us by one of the insurance companies, and I think that the policy that was developed was in connection with a smaller reactor, a test reactor, research reactor, or something of that nature.

They did give us a letter saying that they would provide $1 million coverage with $50,000 deductible to cover loss due to the nuclear phases, on workmen's compensation, public liability, contractual liability, at a cost of $50,000 a year.

Representative COLE. How long ago was that?

Mr. SCHACHT. I would imagine that was 4 or 5 months ago. Maybe longer than that.

Representative COLE. That was in advance, was it not, of the time when insurance companies entered into this problem seriously?

Mr. SCHACHT. Yes; I believe it was.

Representative COLE. Was it a rate that was advanced and offered by one company?

Mr. SCHACHT. One company.

Representative COLE. It was not the reinsurance?

Mr. SCHACHT. No; I don't believe so. It was not a formal proposal. It was in a letter indicating that this was what they would be willing to do. And it has not been withdrawn. But I am saying that——

Representative COLE. In view of subsequent developments do you feel that you are correct in relying on that $50,000 as being an indication of the rate which will be paid for protection?

Mr. SCHACHT. I should say that I am completely at sea. I am spinning around in a vacuum wondering where we are going to land on the insurance problem.

Representative COLE. Of course, we will agree that that is an exorbitant rate, it seems to me, but under the circumstances, it is under-

standable that it being thrown up to that one company and not having given it too great consideration of the risk involved, they would fix it necessarily high.

Mr. SCHACHT. I want to make it clear that I am not condemning the insurance company for not coming out quickly with a rate that everybody feels is a very fine rate, because they have a very tough problem, and I appreciate it.

Chairman ANDERSON. With the coverage as you outlined it, I am not so sure the rate is going to be too high, with the excess limits and workmen's compensation. With excess limits and workmen's compensation you might run into a case—as well as liability to third parties—of damage to your own plant in excess of $50,000.

You just had a $50,000 general deductible policy, did you not, and everything above that they cover?

Mr. SCHACHT. That did not cover our own plant. As I understand it, it merely covered workmen's compensation, public liability, and contractual liability.

I have this feeling, in connection with this problem, and it may be completely erroneous, but it seems to me that the Federal Government, assuming that they wish to forge ahead with this reactor development program, have some choices that they have to make.

One of them is that they be in the insurance business in some form or another. Maybe the insurance business is the wrong way to put it. Maybe it should be in the indemnity business. If that is not a feasible way, they may have to be in the nuclear power business to get the job done.

Chairman ANDERSON. The next witness is from the Association of Casaulty and Surety Companies. Maybe we can ask him and he can answer some of our problems by his testimony.

Mr. SCHACHT. We have visited back and forth. I am sure that he may not appreciate my laying such a groundwork for questions, but we are either going to have to have the Government get into the insurance phases of this thing, or another alternative is going into the nuclear power, construction and operation in a large way. Or I am afraid the third becomes leaving the field largely for the large groups of utilities with large resources, and I am not so sure but that many of those companies are already committed in this program and probably cannot go on with the numerous types of reactors that should be developed.

Mr. Cisler, this morning indicated how many organizations are tied in with his, presumably. I assume they are not willing to go on with a half dozen other reactors to the same extent.

Chairman ANDERSON. Are there any additional questions?

Thank you very much, Mr. Schacht.

Mr. SCHACHT. Thank you, Mr. Chairman.

Chairman ANDERSON. With that fine introduction by the previous witness, Mr. Haugh, you can get your rate book out and start giving us figures.

STATEMENT OF CHARLES J. HAUGH, ON BEHALF OF THE ASSOCIATION OF CASUALTY AND SURETY COMPANIES

Mr. HAUGH. Thank you, Senator. The rate book I did not bring with me at this moment.

If I may, the name is Charles J. Haugh, second vice-president, Travelers Insurance Co. And I suppose I had better get in the rest of this. I am chairman of the committee of the Association of Casualty and Surety Companies on liability insurance for nuclear reactors; members of the insurance study group established by the Atomic Energy Commission and a representative of my company on the governing committee of the Nuclear Energy Liability Insurance Association, which was recently organized by the capital stock companies to afford liability insurance for nuclear reactors.

Chairman ANDERSON. Let me ask you this: Is the Association of Casualty and Surety Companies tied in with the Association of Casualty and Surety Executives?

Mr. HAUGH. It is its successor. That word "executives" is gone and we have substituted "companies." The membership of the organization continues to be by companies. That name executives in there was a misnomer. They really belong by companies, but I think perhaps in the early stages possibly some of the early founders felt it sounded more formidable. I don't know, sir. But we are more realistic now and call it the Association of Casualty and Surety Companies.

If I may, sir, I would like to read the prepared statement that I have submitted.

I should like to state at the outset that my remarks will be confined to insurance against radiation liability hazards arising out of, or pertaining to, nuclear reactor installations and the facility which the capital stock insurance companies have organized to afford such insurance.

For many months the committee of the Association of Casualty and Surety Companies has been working on the organization of a syndicate of stock capital companies in order to make available for this hazard amounts of insurance far greater than have heretofore been available or been sought in the field of liability insurance.

I am glad to be able to report that on May 9 the Nuclear Energy Liability Insurance Association was formally organized for the purpose of affording such insurance, and it is expected that that organization will be able to afford as much as $50 million liability coverage for each reactor location. This amount of liability insurance is far in excess of amounts which the industry has heretofore been called upon to furnish. Up to the present time, instances in which insurance of as much as $10 million have been sought have been extremely rare.

Chairman ANDERSON. I think it would be good at this point to put in there whether or not the association has or will have capital.

Mr. HAUGH. It will not have capital, sir.

Chairman ANDERSON. Is that somewhat like some of the marine insurance pools?

Mr. HAUGH. Precisely. It is a pool; yes, sir.

In the event of claim being made for radiation injury or damage arising out of the operation of a reactor, it is quite possible that such claim might be brought, not only against the operator of the reactor, but also against one or more other entities who might be alleged to have some liability for injury arising out of their responsibility for the construction, design, installation, or operation of the reactor or some of its component parts.

Such entities would include, among others, the designer, the general contractor, subcontractors, manufacturers of components of the reactor, manufacturers of auxiliary equipment, et cetera.

Obviously, the insurance syndicate cannot pyramid the amounts at risk on any one reactor. It appears that this problem can be met most feasibly by including as insured in the radiation liability policy of the operator of the reactor all other interests which may be involved in a claim for injury or damage attributed to that reactor.

It is anticipated that the premiums for liability insurance of reactors will have to be determined for each individual reactor installation. Such determination will require consideration of a great deal of detailed information including but not limited to the actual location of the reactor, its proximity to watersheds and areas of concentrated population, the power level, the type of reactor, the nature and extent of its containment, meteorological and hydrological conditions prevailing in the area, et cetera.

Representative COLE. This might be a good point to discuss with Mr. Haugh the question which Mr. Schacht brought out in his testimony.

Mr. HAUGH. Yes.

Representative COLE. I suggested to Mr. Schacht when he appeared on the stand the probability of the liability of a particular reactor being reflected in the rate for the coverage.

Mr. HAUGH. It is anticipated, Mr. Cole, that for each reactor installation there will be a very careful study in an effort to determine the hazard peculiar to that particular installation, and the extent to which it may have hazards of lesser degree than other installations, such as the population density within a given area in which the reactor is located, such things as the power level, the nature of containment, and so on.

I can conceive of there being differences among them with respect to the containment, and also any other factors which have an appreciable bearing upon the hazard, whether that factor is one which tends to reduce the hazard or is one which tends to increase the hazard from those of other reactors.

In other words, our effort will be to try as best can be done to establish a premium charge for the individual reactor which reflects, as far as we can do so, the hazard of that installation as distinct from others.

Representative COLE. So that your answer to the operator of a facility which might cost $200,000 or $500,000, and therefore, presumably, if it got out of hand would cause very little damage, when he says, "Why should I buy insurance up to $65 million protection when the worst that can happen is not over $200,000"—then your answer is you are paying a pittance for that protection.

Mr. HAUGH. That is it.

Representative COLE. In other words, you will reflect that situation in the rate.

Mr. HAUGH. We are endeavoring to reflect that in the rate; that is right, sir.

Chairman ANDERSON. I was just going to say you are probably dealing with it directly. I see you do in the next paragraph, but will you have a schedule from which that might be made up?

For example, many long years ago I used to make use of a Dean schedule.

Mr. HAUGH. Yes.

Chairman ANDERSON. Will you have something comparable to that?

Mr. HAUGH. I would doubt that it would be in that detail, particularly in the initial stages, Senator.

As I envision it when we start, apparently there are in prospect five power reactors. That is, sizable power reactors, and possibly several of smaller power. In the field of power reactors, from what knowledge I have—and it may be incomplete—that pretty much appears to be the probable picture for the next few years. And it means a very limited number of risks, and I have the distinct impression from what little I know about these several reactors that they are not comparable, one with the other.

There are substantial differences among them. I think it is going to involve consideration of all of the detailed information that can be made available to us by the Atomic Energy Commission with respect to the details of those reactors and the nature of their construction, and that sort of thing, in addition to other information which we may on our own be able to elicit in connection with those reactors. And I doubt that initially we could develop a schedule.

Ultimately, it may very well come down to that, sir.

Chairman ANDERSON. The answer satisfies me completely. I only wanted to be sure for the record that we understood that you may be compelled in the beginning to establish rates without an elaborate system or scale of hazards.

Mr. HAUGH. Yes.

Chairman ANDERSON. In the early days of the fire insurance business, if there had been only five buildings to insure in the United States there would have hardly been a Dean schedule.

Mr. HAUGH. That is right.

Chairman ANDERSON. But later on when there get to be millions of buildings then you can classify them into fireproof and fire resistant and everything else to find out what their hazards are.

Mr. HAUGH. You are quite right.

Chairman ANDERSON. It would be your theory, then, that in the beginning we would have to operate a little like the insurance companies in the fire field, or as they did in the casualty field as they got into it. You would have to set out the conditions that you were going to work on and come up with some sort of a rate on what people might think would be an arbitrary basis, but based on the consideration of all these factors for a while.

Mr. HAUGH. That is right, sir.

Chairman ANDERSON. Then later you might decide that if there were reactors built of the same general type as a certain reactor, and it was located so many miles from a city, and it was so close to a stream of water that might be polluted, and so forth, that you can again use ordinary insurance actuarial standards and come up with a rate for that plant bearing some relationship to the earlier rate on the earlier installation.

Mr. HAUGH. As you gentlemen may know, liability insurance rates are subject to regulation by State supervisory officials in almost all of the States. For companies to act in concert with respect to rates, it is necessary for them to act through the medium of duly licensed rating organizations. The actual establishment and filing of rates then will have to be done through rating organizations.

I anticipate that this can be done insofar as the stock capital companies are concerned through the medium of the National Bureau of Casualty Underwriters, which is an established licensed rating organization in which many of the companies' members of the stock casualty syndicate are already members or subscribers.

Work is already in progress to expedite the functioning of the rating organization and to make certain that the statutory requirements of the individual States are being met. While the statutes of the several States vary somewhat one from another, they generally require that rates to be used must be filed with the supervising authorities and that such rates must be reasonable and adequate.

Chairman ANDERSON. May I interrupt there to say that the individual State, however, would have very little possibility of being able to check that rate to know whether it was adequate because there is a wholly new field and the insurance commissioner of the State of Nevada or Iowa or Illinois would probably not be able to measure that risk very well himself.

Mr. HAUGH. I recognize that, sir. I did want to bring this out for several reasons, not the least of which was this: In the syndicate of the stock companies to which I am referring there are included a vast number of companies, approximately 110 of them, some of whom are members of an established rating organization.

When you issue a syndicate policy where the rates are such that there is one rate or one premium established to be divided among all those companies in the syndicate, they are all using the same rates and they must, one way or another, meet the statutory requirements of the individual States. So provision has to be made to have those companies become either members or subscribers of a rating organization in order to enable the syndicate to function within the statute.

You may say that is a detail, but it is one that has to be met in each of the 48 States, or in each State in which the syndicate will operate. I hope ultimately it will be in 48.

Representative COLE. Is there any question in the minds of your counsel or legal people that this syndicate which has been organized is not in conflict with the monopoly laws and restraint of trade laws and so forth?

Mr. HAUGH. We have gone into that, Mr. Cole, to some extent. We had our counsel study that at length, because it, in effect, means a single market for that entire group.

Their considered judgment—and I believe it is customary for an attorney—and I don't blame them—not to say positively and beyond a shadow of a doubt you are in the clear, but it is his considered judgment——

Representative COLE. Especially in recent years.

Mr. HAUGH. That it is legal. For actually, unless it is done that way you cannot create a market.

Representative COLE. Assume 5 years from now the Attorney General on complaint of some company not in the syndicate successfully brought action against the syndicate and required it to break up. What would happen to the policies of the reactor operators?

Mr. HAUGH. If that were done, and it was required to break up—I am speculating, you understand—I would think probably it would be going through a series of courts for some time. And after we got

the unhappy word in the first court we would be undertaking before it got through the last one to find another answer.

Representative COLE. Find another accident?

Mr. HAUGH. An answer. I don't know what it would be, sir. But perhaps over a period of years—and I am sincerely hopeful that this will come about—perhaps over a period of years, after these initial reactors have been built and operated and all of us find that our fears do not appear to be founded, we may discover that the demands for insurance protection will diminish and that insurance capacity will tend to increase and the need for syndicates will disappear. I hope that comes to pass.

Representative COLE. Then I judge that this is not a phase that is causing you such concern that you feel it should be met now?

Mr. HAUGH. No, sir. As I say, we have had what we consider competent counsel study this at some length. It is, in some respects, not radically different from a situation which exists in some other insurance markets where the only way you can make available adequate insurance capacity is through the medium of a pool, companies grouping together to afford insurance. And in some instances there may be 1 or 2 pools which are practically the sole source for that kind of insurance in the country.

But it is the only way we have been able to figure out to meet demands for very large, extraordinarily large amounts of insurance for relatively few risks.

Representative PRICE. Mr. Chairman?

Chairman ANDERSON. Yes, sir.

Representative PRICE. Since we are talking about the antitrust violations, in setting up your pool did you exclude any companies from coming in if they wanted to come in?

Mr. HAUGH. No. I might answer it this way, Mr. Price: In the first instance, we invited stock companies. This particular pool is made up of stock companies. There is a similar pool made up of mutual companies, but I would rather have someone representing them testify with regard to that. It would be hearsay with me.

The stock companies invited to join this syndicate were all the stock companies rated in Best's Analysis.

You may say why did I take that? That is one publication nationwide that publishes the financial statements of all the companies licensed in the country that will furnish the information upon which to base it.

If we couldn't get the financial statement of a company we could not invite them in—and I think perhaps justifiably so. We did not refuse to invite anyone. As mentioned yesterday—I think you were not here, Mr. Price—but in response to a question Mr. Cole asked, a number of companies, small companies, indicated a lack of desire to come in, largely on the ground that their operations are very limited.

They may operate only in a specialized field or a specialized area. They would be willing to take only a very, very limited amount. They felt, under the circumstances, they would not want to come in.

We have not excluded any company.

Now that the syndicate has been organized, we set up a minimum participation for a company to join us at $25,000. In other words, if a company is to come in they must be willing to take and retain for their own account at least $25,000. We feel that is a reasonable sum.

We had 2 companies that initially indicated smaller amounts, one of $20,000 and one of $15,000; and the last I heard the one that had indicated 20 said, "Well, I will make it 25." And the one that said, "I will make it 15," said "I was not very enthusiastic anyway, so I don't think I want to come in."

There was 1 company that asked if we would be interested if they came in for $2,000, and we told them "No." But I wouldn't call that a rejection.

Representative PRICE. The door is still open?

Mr. HAUGH. We would be very glad to have more companies come and give us increased capacity. I realize that is the opposite of what Mr. Schacht said, but later on I would like to get back and talk to that subject.

Representative COLE. What was your reason for the minimum?

Mr. HAUGH. The $25,000?

Representative COLE. Or whatever it may be.

Mr. HAUGH. We think a company should have a sizable amount of participation. We have in our syndicate a total capacity of $50 million, and we think if anyone is to come in and participate they should do so for an appreciable amount. We are going to have to express participation as percentages. Because I can conceive of individual companies, particularly in small test reactors, coming to our syndicate and asking for amounts of insurance less than our $50 million we are going to have to express all participations as percentages. When you relate $25,000 to $50 million, you get a very small percent, and we don't want to get down into insignificant figures.

Frankly, we want in the syndicate, sir, acceptable companies—their names are going to appear on the policy. We don't want to be in a position where we have some companies that are so very, very small, of such tiny resources, that the insured, buying the policy, says, "Well, now, wait. I don't want to have my liability insurance in part exposed to a company whose assets are only so much money."

Now, in order to have a $25,000 participation, they must have at least $250,000 surplus, capital plus surplus; it doesn't have to be surplus alone. They must have at least that much in excess of their liabilities in order to retain $25,000. And we feel an insurance contract should have at least that much money behind it for anyone in the syndicate.

Representative COLE. You have just thrown a monkey wrench into this, when you said the operators come in and say, "I want $50 million worth of participation," and another may say, "I only want $500,000," and another, "I only want the minimum."

Mr. HAUGH. Yes, sir.

Representative COLE. Now, I judge that you are going to grant a policy in that amount.

Mr. HAUGH. Yes, sir.

Representative COLE. Which is contrary to what my understanding has been. I thought that this $50 million or $65 million, actually, is going to be available for each one of the atomic facilities, irrespective of the size, or irrespective of the wishes of the operator.

Mr. HAUGH. Mr. Cole, I must have been misunderstood. It is available. But suppose one reactor operator—well, I perhaps should go a little further. In addition to reactors, we contemplate making this facility available to insure the radiation liability of such opera-

tions as fuel fabricators, and what I will call operations related to nuclear reactors, but there may not be an actual reactor.

For instance, someone who has a fuel fabricating plant might come to the syndicate and say, "I want the radiation liability insured, and I want $10 million," or "I want $25 million." I would see no reason for us not to offer them that insurance.

Representative COLE. What happens if the damage is $15 million?

Mr. HAUGH. If he buys $10 million, and it is $15 million?

Representative COLE. Yes.

Mr. HAUGH. That particular assured is going to be liable for $5 million of it. Just what happens today. If he buys $5 million, that is, and there is a loss of $6 million.

Representative COLE. Earlier in our discussion, since you have been on the stanad, I got the impression from your statement that this situation was going to be corrected. The situation I have in mind is the man that does not want the full $65 million protection and wants something less; that that is going to be corrected, coupled with a reduced rate.

Mr. HAUGH. Well, the rates, certainly, are not going to be the same for the last million as they are for the first million. Of course, the latter will be greater.

My point, sir, is this: If an assured who has a radiation liability to be insured, whether it be a fuel fabricator or other operation—I have been told there is at least one test reactor in operation that carries no insurance, for instance—if they come to purchase insurance for less than is available in the syndicate, if they are willing to assume the liability over that, that is something for them to determine, sir, and I couldn't put myself in the position of saying, "They must always buy the maximum amount of insurance I have." In all the kinds of insurance we sell, we like to sell as much as we can, but we can't always sell the maximum.

Representative COLE. Why can you not put yourself in that position, and say, "We are going to give you the blank policy. Take it all. But we are going to charge you much less for your protection, because the liability of your damage is relatively insignificant."

Mr. HAUGH. I am perfectly willing to, but if he doesn't want to buy it, I cannot force him to. That is a concept, sir, I have never encountered in the insurance business.

Representative COLE. If the cost to him is the same? If the cost to him is the same when he buys $10 million of the liability, or $65 million.

Mr. HAUGH. Well, I couldn't conceive of the cost being the same.

Representative COLE. It could be the same, could it not?

Mr. HAUGH. No, sir. Under no circumstances. If he buys $10 million——

Representative COLE. If your rate is reduced, adjusted, in accordance with the probable damage, then the result would be the same, would it not?

Mr. HAUGH. No. It couldn't.

What you do is this: You endeavor to determine the probability of there being a loss. I am using these figures for the purpose of illustration only. You might endeavor to determine the probability of a loss of a million dollars or less and determine a rate, and you might determine that for the next $9 million, the probability is somewhat

less. So you would have a lower rate. And the next $10 million, still less.

I do not believe that there is ever a point where anybody in the insurance business can say, "Above this point I will give the insurance for nothing." Never. If you could afford to give it away, the hazard doesn't exist, and he doesn't need it. If he needs it, and I am going to be liable to pay the loss, I want some money for it.

Now, I may vary the amount of money I want for it, depending upon the hazard of the individual risk. But I would never give it away, sir.

Representative COLE. I would not want or expect you to give away the protection. But for the life of me, I cannot understand. For the sake of illustration, an insured's worst calculated damage is, we will say, $1 million. For that the rate is, we will say, $1,000. And I am only thinking out loud.

Mr. HAUGH. I just shuddered.

Reperesentative COLE. And assume that one insured has a potential risk of damage in the amount of $50 million.

Mr. HAUGH. Yes, sir.

Representative COLE. Your rate to him for the first million dollars of that 50 is $1,000, we will say. Your rate for the next $9 million of possible damage is $7,000, we will say.

Now, why can't assured B, whose ultimate worst calculated damage is, at the worst, a million dollars, or one-fiftieth of the worst of assured A—why can't he argue with me and with you, and why shouldn't you give him a rate, we will say, of one-fiftieth of the rate you would charge B?

Mr. HAUGH. If his hazard is proportionately less, his rate will be less. But he is going to have to pay varying rates for varying blocks.

Now, I will say this to you, Mr. Cole. I can understand the reasoning behind it, but if, coupled with insurance—I was thinking in terms of insurance alone for the moment—if coupled with insurance there were to be an indemnity program in which the Government, above some level—and again let me pick $50 million as a round figure for the sake of discussion—that a Government indemnity program were to pick up this excess of $50 million, I could conceive of your objective being obtained if the regulations providing for the licensing of reactors were to require that in order to secure a license it would be necessary to demonstrate financial responsibility up to $50 million, and then automatically anyone who was seeking to get Government indemnity would purchase $50 million or would otherwise meet it. They might put up securities or a financial statement, but whatever the way, if they met the financial responsibility test, in that way it could be done.

Frankly, thinking off the cuff on this—I have never gone through it very well—for insurance companies to in effect say to a prospective insured, "If you want to buy insurance for me, you will have to buy $50 million"—I think maybe I would get in trouble with some insurance authorities.

Representative COLE. But if it is required by some other person?

Mr. HAUGH. That is different.

Chairman ANDERSON. It might be possible that the Atomic Energy Commission might want to put some provision in before they would license someone.

Mr. HAUGH. That would be quite different.

Chairman ANDERSON. It occurred to me that it is a little like going to a very small bank in a small community, to a man who is there all day long, probably the owner of a large share of the bank, and you write a bond and put a $25,000 top limit on it. But you go to a large city bank, and you put a $10 million limit on it. And if you said to the small country banker that he had to get $10 million worth of protection, he would say, "I never had more than $25,000 of cash around the place." You run into difficulties there. But it could be possible. If you were going to operate a certain type of reactor, you must be in a position to buy a certain size policy.

Mr. HAUGH. That is right. Yes, sir.

As mentioned earlier, the rates are going to have to be based upon informed judgment, taking into consideration all the conditions which may affect the liability hazards of that particular installation. I believe that those rates should contain some provisions for the accumulation by the syndicate over a reasonable period of years of a fund sufficient to absorb a catastrophic loss. I would expect that the rating procedure ultimately developed would include some such provision.

Chairman ANDERSON. May I stop you there? You suggested that—

> Those rates should contain provision for the accumulation by the syndicate over a reasonable period of years of a fund sufficient to absorb a catastrophic loss.

And earlier you suggested maybe that might be $50 million. You mean the fund would build up to a surplus of $50 million?

Mr. HAUGH. Well, I purposely did not put the sum of money in there. Because it is something that would have to be determined.

Chairman ANDERSON. Is that not what you have to read into your statement?

Mr. HAUGH. No, not to that extent. Because first you would have to say over how many years from how many risks, sir. And that is why I did not put it in that way.

I am just talking for myself.

Chairman ANDERSON. Over how many years from how many risks still comes out at the same total, does it not, $50 million, or $65 million?

Mr. HAUGH. Over a number of years and a number of risks, when these things become more general in their operation, I would expect that one way or another there would be accumulated sufficient funds to take care of any catastrophe in the event it happens. Now, that is true of every kind of insurance we write. But it may take lots of years to accumulate it. And it takes a great many risks. Do not misunderstand me. I do not for a moment suggest that within 5 years on 5 reactors you should accumulate $50 million. I do not mean any such thing as that, sir.

Chairman ANDERSON. I did not attempt to translate that into it, but I was looking at this statement.

Mr. HAUGH. Well, what I mean to say here, and it seems to me it should be said, so that it would not be misunderstood, is that in the writing of any form of catastrophic coverage, losses are extremely infrequent. They are expected to be extremely infrequent. When they do happen, it is expected that the money will be there and laid on the table to meet them; that the companies, one way or another, over a

period of time, will get the money to pay losses by writing insurance and accumulating funds. There are good years, there are bad years, and over the years you have to accumulate enough to pay the losses.

Chairman ANDERSON. But the rate on a dwelling house policy in that community contemplates a fire every 400 years. You have so much per thousand dollars of coverage. That is every 400 years. Now, if you write this on the basis that every 400 years you might have a catastrophic loss, it would not be noticeable.

Mr. HAUGH. That would not, I agree. I think perhaps we each used extreme examples. I said obviously we did not mean 5 years with 5 reactors, and I think obviously we do not mean 400 years. But I cannot tell you how many years or how many reactors. I think a reasonable charge of some sort should always be made in any excess insurance coverages in order to make available the funds to meet the losses. You hope they do not occur early in the proceedings. If they do, you do not have the money. You pay it. You disburse it from your surplus. And over the years you figure, "Well, it will average out."

Chairman ANDERSON. I think that is correct. I am not trying to quarrel with that; unless we get the rate so high that nobody can carry it, or we have such a situation as described in connection with Mr. Searing's company, where only a part of the people can carry it. We have to bear in mind there are many small organizations that hope to be in this program, and the minimum premium is going to be quite a little to them. And if that rate is loaded by any early absorption of the catastrophic loss, it makes it that much more difficult to buy it.

I wanted you to qualify it, and I think you have done so, that you do not expect to get this in the first 3 or 4 years.

Mr. HAUGH. That is right. But I thought it only fair that some such provision should be there, in case someone later said, "You didn't indicate that it was there." It is a normal procedure, but I wanted to bring it out.

While, as stated earlier, the amount of liability insurance which is being made available in connection with reactors is vastly greater than anything the insurance industry has heretofore been called upon to furnish, it is a fact that the potential maximum liability which might arise as a result of an excursion under the most unfavorable circumstances presumably could result in losses far in excess of available amounts of insurance. The probability of any such loss appears to be very remote. However, while such a loss may be improbable, it is possible. I am confident that the capital-stock insurance companies would have no objection to legislation which might provide for governmental indemnity over and above available amounts of insurance. If such legislation were to be enacted, I would urge that it cover the liability of all parties in interest, including not only reactor operators and equipment manufacturers, but also contractors, subcontractors, designers, installers, and any other party who might be held liable on a basis similar to that proposed to be made available in connection with the liability insurance coverage. I would suggest, also, that any such legislation include a statement of the amount of insurance above which any such governmental indemnity would be effective. Or if not a specific amount of insurance, then provide that the licensees furnish evidence of financial responsibility in an

amount to be specified in the legislation and to be substantially equal to the amount of insurance to be made available.

Chairman ANDERSON. Now let me understand that. That would mean if the amount available by all the total insurance companies, stock and mutual, were $65 million, the Government insurance, if any, the Government indemnity, would be effective only above that figure. And if somebody did not take the full $65 million, because it is a university that is operating merely a research reactor, they must furnish evidence of financial responsibility to bridge that gap between the $5 million they take and the $65 million that is available.

Mr. HAUGH. This may be kind of lengthy, but let me try it.

Chairman ANDERSON. This is the very problem we had with Mr. Schacht a minute ago. He doesn't want to buy $65 million.

Mr. HAUGH. I understand that.

Now, first may I, in the interest only of clarification, avoiding any possible misunderstanding in the future: While we talk here of 65, that amount will be available, provided a part of the 15 of the 1 syndicate is not used for property insurance. There might be a case, you see, where that 15 is available for 2 kinds of insurance, property and liability. And so in my illustrations I keep talking 50, because we know that is limited to liability only.

Now, if you don't mind, I will use that figure. I am not quarreling, but I wanted to make that differentiation.

As I envision it, if the Government is going to say in excess of a figure beyond which it ceases to be insurance, and for the protection of the public—this whole thing primarily is to protect the public, and incidentally it protects the people who would be directly responsible to the public, assuming that they had the financial capacity to assume unlimited responsibility. If we are going to say the Government is to protect the public in excess of a prescribed amount, then, sir, when I get to the case of the one you cite, an educational institution, I realize it varies by State, but many of them have immunity.

Now, if they have immunity, I do not quite follow the line of reasoning. I am not quibbling, but I just do not follow the line of reasoning that the immunity ceases at a point of $50 million and the Government picks up. If so, what happens to the first $50 million?

Chairman ANDERSON. I think I can help your understanding why some people have some worry about it. I recall very distinctly one time driving home in Washington on a very slick and icy night and starting down the grade and having a serviceman, during the time of war, wearing a uniform, come out in an intoxicated condition and pull his car straight out from the curb in the middle of the street, and I had nowhere to go, so I hit him. He had no insurance, and he promptly suggested that a man in public life could not sue a serviceman and live with it thereafter. He said, "You better get your car fixed the best way you can. Now, what about fixing mine?"

I thought I had some rights, maybe, in the situation.

Now, you say that because the State is operating this research reactor, even though it may kill a hundred people, the State has immunity as to those hundred people, even though they lost their breadwinner and can't sue anybody. I don't believe that is a very complete answer from the standpoint of the public.

Mr. HAUGH. No. I am quite in agreement with you on it.

Chairman ANDERSON. What do you propose to do about it?

Mr. HAUGH. Only 1 of 2 things that I can see. I am back to my original recommendation here: that a logical way to do this, sir, is to say, the State may have laws regarding immunity, and they may vary. The Federal Government has the right to issue a license for the construction and operation of a reactor, through the Atomic Energy Commission. And they may say, "You may or may not operate one." They may set up requirements which are to be met if one is to be operated. One of those requirements, sir, could be evidence of financial responsibility. Now, I would think a State could if it wishes to, file evidence of financial responsibility, without purchasing insurance. I am willing to sell them insurance.

Representative COLE. They could show their financial responsibility. But that would not impose upon them liability.

Mr. HAUGH. Unless they accepted it. If they accepted it. That is what I meant.

Chairman ANDERSON. Now take the case of Pennsylvania State College, and North Carolina, which are operating research reactors. I do not think there is any great danger, but something might be available to them. What I am trying to get around to is: After I heard Dr. Libby's testimony the other day—very many times insurance policies are written over primary coverages that vary depending upon the type of insurance.

Mr. HAUGH. That is right.

Chairman ANDERSON. Now, would you think the primary coverage on a purely research reactor might be, let us say, $2 million, or $5 million, and let Government insurance pick up above that level? The probability that a research reactor is going to run wild is somewhat limited. And if it does run wild, we have had experience with the fact that it does not necessarily tear up the landscape. It may not involve any property damage. It may not involve any loss of life. So you might be able to fix a different point at which the Government responsibility would attach on a research reactor of a given size. If that were true, following Dr. Libby's testimony the other day, he indicated that a 10,000 kilowatt power reactor would have quite a different effect from a 100,000 kilowatt reactor.

Might it not be possible that the Government reinsurance would pick up at a different level for a 10,000-kilowatt reactor than it did for a 100,000 kilowatt? I am not asking you to commit yourself finally, because this is an insurance point. It is one I had not thought about until just now. But might we not get around to the difficulty that has worried Congressman Cole and worried me, of saying everything has to start at $50 million?

Mr. HAUGH. I am not for a moment taking the position that beyond the shadow of a doubt it must start at $50 million. But when it doesn't, I get a little confused as to how it is going to operate.

However, I would urge first, this: Whatever the points are to be, it impresses me that it would be desirable to have them included in any legislation that were enacted, so that it is specific; so that it is spelled out what they are.

Chairman ANDERSON. I would say as far as I am concerned I would like to have your recommendation and Mr. Kelly's recommendation and any other recommendations as to whether or not it might be

possible to attach the Government insurance at a different point for different styles and different types of reactors, for different uses of reactors; that a research reactor might permit Government indemnity at a much different level than for a power reactor. But think about it and give us any comments you have.

Mr. HAUGH. I would like to think that over, if you don't mind, sir. Sometimes these horseback statements later come back to haunt me.

Chairman ANDERSON. Of course, this is a hard problem for this committee to concern itself with. But we would like to come up with as good an answer as we can.

Mr. HAUGH. In all fairness, I must look at it this way. The basic objective, as I understand it, of this whole thing is the protection of the public in the remote event the almost impossible should happen. That is really basically what underlies this whole thing, just if it should happen. Now, while it is far less probable on some of these low-powered reactors, you will recall Commissioner Libby also said this, that certain of his statements were based upon the assumption, that 1 percent of the accumulated fission products might be released. And then he said for a 10,000-kilowatt reactor, the extent of the damage would be materially less than under a similar 100,000-kilowatt reactor. Then he went on and said:

> Of course, in the very remote event that we had a horrible catastrophe and a hundred percent of the fission products were released, the damage would be much more extensive.

Chairman ANDERSON. But that damage was only about $200 million.

Mr. HAUGH. I would be the last man on earth to say that I am anywhere as near well qualified as Commissioner Libby to determine the extent of the damage. But I would point this out: that there are various opinions and various estimates that have been made by various people as to the possible, not probable, sir, but possible, costs, under the most unfavorable conditions. I hesitate on all of this, because apparently the only thing that appeals to the press is big figures, and it gets out and sounds as if we thought these things were going to blow up by the dozen.

Chairman ANDERSON. No. But there again is something that concerns us. You say that while you would not question Dr. Libby—and neither would I. We both think he is an extremely capable and competent man. You say estimates have been prepared.

Mr. HAUGH. That is right.

Chairman ANDERSON. I do know some other estimates have been prepared, and one of them was shown to me, but shown me in such a fashion that I must not reveal it, or talk about it.

Mr. HAUGH. That must have been the same one I saw, sir.

Chairman ANDERSON. Yes. Do you not think it would be nice if we got that thing in the record some place?

Mr. HAUGH. I am under the same wraps that you are. I am frank to tell you I do not know what is confidential and what is secret, and I am "Q" cleared, and in case of doubt I don't say anything.

Chairman ANDERSON. This has nothing to do with "Q" clearance. This one I saw was by an organization that just said, "We do not want to sponsor this, but we think the damage can run to $5 billion." Well, I don't blame them for wanting not to sponsor it. It was a composite of a hundred guesses. And it would be interesting if we

could get that in the record, but nobody wants to put in the record the basis.

Mr. HAUGH. I do not have it to put in the record, Senator.

Representative COLE. May I inquire of you two gentlemen who have had access to the inner sanctum: As to these people that made the estimate, did they know what they were talking about?

Mr. HAUGH. In my judgment, yes, sir. But bear this in mind. They presented it in good faith. They said it is just what Senator Anderson mentioned. It is an estimate that if this should happen, this might be thus and so. It isn't that they could conclusively demonstrate it would be thus and so. But they had a set of conditions under which it at least was a plausible guess that under these conditions—they were most abnormal—it might happen.

Chairman ANDERSON. I do want to say that the people that prepared this estimate are high-type, fine people, who were only trying to contribute a service.

Mr. HAUGH. Oh, yes. That is right.

Chairman ANDERSON. And we do believe it was a guess, to be sure. But we have to have some guess as to what it might be. Otherwise we would be lower than we ought to be, perhaps.

Mr. HAUGH. But it is for reasons of that kind that I point out that even with relatively small reactors, under the most unfavorable and most horrible conditions, that no one ever expects will come to pass, it might be that a loss in excess of $50 million could happen. Now, if it does, we are all seeking to see that there is protection there.

If the answer is that the legislation says in this case $5 million is enough and in that case $10 million is enough and in another case it is $50 million, who picks up the tab in between, to protect the public? That is the one that I am somewhat confused on, sir.

Chairman ANDERSON. Maybe the Government might, as it gives its license, indicate the minimum amount of insurance that should be carried and have the Government indemnity pick up above that amount.

Representative COLE. While you are thinking about that method of approaching this, in dealing with the varying strength reactors, also think about the idea that it occurs to me that that approach is confusing.

Mr. HAUGH. It confuses me.

Representative COLE. And it might subject the Commission to a charge of favoritism and so forth.

Mr. HAUGH. That is right.

Representative COLE. There is the alternative under the law of requiring the Commission to exact of each licensee a proof of financial capacity equal to the highest available insurance.

Mr. HAUGH. That, sir, of course would do it.

Representative COLE. And at the same time to waive its immunity.

Mr. HAUGH. Yes.

Representative COLE. And then let you folks, when you come to sit down and write the policy for that peanut, that reactor, give him a rate so that his cost is negligible. Then when you write the rate for the big fellow, his rate will be comparable to the likelihood of the damage.

Mr. HAUGH. In the event the Congress enacts legislation providing for governmental indemnity over and above available amounts of

insurance, I am confident that the insurance industry would be quite willing to marshal its facilities on a reasonable basis to handle the processing of claims on behalf of the Government in connection with its liability under this indemnification. On behalf of the capital stock casualty insurance companies, I would like to thank you and the members of the committee for this opportunity to appear before you.

Representative COLE. What would be the situation, Mr. Haugh, in case an incident occurs where it appears that the prospective damage is $600 million; assuming that the Federal indemnity attaches, from $65 million to $500 million, as has been suggested. How would the claims be liquidated? Assume that the original estimate is $700 million. The Federal ceiling is $500,000. The private insurance is $65 million. How would a claim be handled?

Mr. HAUGH. I can only speculate, sir. I would think first, in the event something occurs that causes as widespread damage as that, that I would envision a session of the Congress, while we were in the course of assembling all of the material on those claims, assuming the Government wants the insurance companies to process these and assemble the material. In the event the Congress determined that $500 million is the maximum Government liability, and the insurance is $65 million, there is $565 million, and we will use $700 million as the total amount of claims properly evaluated. I do not know how that could be handled and how you would apportion it, unless you follow a procedure such as is followed in a bankruptcy court, sir, where you went somewhere to have someone determine a proration of the thing. You understand, this is just an offhand expression of opinion. It is not something that I have had an opportunity to give careful consideration to.

But I would think that is the only possible out. But I would guess, sir, that you and the other Members of Congress would be importuned to modify your legislation to increase the five to seven hundred million.

Representative COLE. It appears to me the wiser course would be in the law now to anticipate that situation.

Mr. HAUGH. It would avoid all that difficulty.

Representative COLE. That would require a proration. Then, in the event that a Congress reconvening after the indemnity had been met and the claims had been prorated—if the Congress then feels an obligation on the part of the Government to make up the balance, it can appropriate the money to do so.

Mr. HAUGH. In that event, sir, in addition to providing for proration, there would also have to be some provision specifying the period of time in which claims could be brought. Because you could not prorate until you had allowed the statutory period. And it would mean that no one could be paid anything until that period of time had elapsed.

Representative COLE. What is that period of time that you contemplate for your policies?

Mr. HAUGH. In the event of losses, we hope to start settling them promptly. You say, "If it exceeds the amount of our coverage." That is another story.

Representative COLE. I am thinking of the time within which a claim must be presented.

Mr. HAUGH. Oh, I see. I am sorry.

Well, now, actually, the policy phrasing has not been promulgated. We are going to issue a liability policy, under which we would insure the liability of our policyholder, and whatever the statutory requirements are with respect to the filing of claims this would govern with respect to our liability. I would expect, when the policy is finally drafted, and as issued, there would have to be some discovery period, following any time when the insurance might have been terminated. Someone might decide to no longer insure. There would have to be some reasonable discovery period.

Representative COLE. What do you think that might be?

Mr. HAUGH. Oh, I don't know. Perhaps a couple of years.

Chairman ANDERSON. That is similar to the fact that in a blanket form you say they have to find out the embezzlement within a reasonable time?

Mr. HAUGH. That is right, sir. Yes, sir. You have to set some period of time, but it has to be a reasonable period.

Representative COLE. We are not predicating this period on the period that is set in an industrial hazard, because by the very nature of the hazard the damage may not develop for years.

Mr. HAUGH. That is quite right. And so long as the insurance continues in effect, we would continue to insure it. I am talking of cases where someone decided to terminate the whole thing.

Representative COLE. That is what I am talking about, too. And you say this discovery period would have to be within 2 years.

Mr. HAUGH. Well, I did not want to say 2 years was the exact figure. You say, "How much?" I said, "Offhand, 2 years." It is not that I hold a brief for 18 months, 2 years, 30 months, or anything of that kind. Some reasonable period of time within which one can say, "After all insurance is terminated, and there is a substantial period of time allowed for bringing against those expired contracts any action," there has to be a period of time when we can say, "We have come to the end. We are through."

Representative COLE. Whether it is 18 months, or 36 months, you apparently have in mind a period much less than what I have in mind it should be.

Mr. HAUGH. Well, possibly so. I don't know what period of time you had in mind.

Representative COLE. I do not know that I had any exactly, but I would say it should be near the area of 7 to 10 years.

Mr. HAUGH. Well, I don't know whether under the statute of limitations you can bring a claim within that period of time that will vary again by State. There are statutes, of course, in the individual States governing the period of time within which a claim must be brought.

Representative COLE. That is a question which can be resolved rather explicitly, can it not, by the medical group?

Mr. HAUGH. By the medical and the lawyers, both.

Representative COLE. They can forecast the period of time within which a disability will result from exposure to radiation.

Mr. HAUGH. I see what you are getting at. I would think so; yes.

Representative COLE. And you would think that whether that period is 2 years or 10 years, if the medical people indicate with reasonable agreement and concurrence and accuracy that there is a measureable period of time within which a disability could be discovered, that

that should be the unit that is used in the coverage by the insurance company.

Mr. HAUGH. Well, now, the 10 years startles me a little. I don't want to say "Yes" or "No."

Representative COLE. I am not saying whether it is 2 years or 10. If it is a reasonable period——

Mr. HAUGH. Within a reasonable period; yes. But I would want to see the whole story before committing myself to a long period such as 10 years. That is quite a protracted period of time to commit oneself to.

Representative COLE. What would you think, then, if the medical people would agree that it is conceivably possible for a person to be exposed to radiation and not discover a physical injury for 50 years?

Mr. HAUGH. Well, I would think that that is stretching it considerably.

Representative COLE. That is extreme; yes.

Mr. HAUGH. That is extreme, when you say 50 years.

Representative COLE. I threw out the 50 to make it easier for you to accept the 10.

Mr. HAUGH. All of these things are relative.

Chairman ANDERSON. Is there anyway that you can give Mr. Schacht or those similarly situated to him any assurance that he will be able to get a quotation at reasonable rates within a reasonable time? We are using this term "reasonable" pretty regularly. When do you think he will get a rate?

Mr. HAUGH. Well, now that we have our syndicate organized, we are in a position to start moving more rapidly on rates. Now, while he talked about them, I am a little confused as to what is involved. For instance, when there was discussion here about insurance of machinery. Now, normally, turbogenerators are insured under boiler machinery policies, and so far as the normal insurance on a turbogenerator is concerned, I do not think we have Mr. Schacht's insurance now, but we are interested. We insure boiler machinery and turbogenerators throughout the country.

I am surprised that he is not already insured. As far as compensation is concerned, I was a little at a loss to understand the quotation, unless Mr. Schacht is a self-insurer and was undertaking to buy an excess contract over $50,000. Because a "comp" policy has no exclusion in it, and radiation or no radiation, the loss is covered under workmen's compensation.

I referred to workmen's compensation. I am sorry. I said "comp." That would cover injury arising out of a reactor as far as the employees of that reactor operator are concerned. There is no exclusion in that contract today.

Chairman ANDERSON. Yes, but you have a condition in connection with it, however, that arises steadily, and that is that an employee who claims to be injured has to report the injury within a specified time, usually about a year, from the time of his injury or exposure. And he may not know for 3 or 4 years that he was exposed. So you may have some problems there arising for subsequent legislation.

Mr. HAUGH. That might be possible. But I would hope, Senator, that is not going to happen.

The few reactor installations that I have been privileged to visit have insisted that I—and I noticed that all the employees also did,

wear a dosimeter of some sort. And he knows he is exposed, and there is an established procedure that requires everyone to check in with that dosimeter when they come in, and you will know within 12 hours whether that fellow has been exposed or hasn't. And it won't be a year; it will be a day.

Chairman ANDERSON. There again you come back to the fact that it is the regulations of the Atomic Energy Commission and the people who licensed the reactor that gives the real protection to the workmen.

Mr. HAUGH. Yes, sir, it is.

Chairman ANDERSON. Should the Federal Government have any authority whatever in fixing the rate? It is going to require this man maybe to carry insurance. I ask that question because we will say a reactor is going to be built next door to the Los Alamos Laboratory. Without disparaging any good qualities he might have, what would the insurance commissioner of New Mexico know as to the hazard and therefore as to the fairness of the rate?

Mr. HAUGH. I can only say this, that it would seem to me it would lead to almost hopeless confusion if we are going to superimpose upon State regulation, State rate regulation, Federal rate regulation, so that we have a minimum of two rate regulatory bodies passing upon the rating.

Chairman ANDERSON. Do you feel, then, assuming that that is an answer to it—it might be compelling, and it is very compelling to me—do you believe that the Association of Insurance Commissioners might be having some sort of a committee that is dealing with this problem?

Mr. HAUGH. They have a committee that is considering it. In fact, as I came up here the chairman of that committee was in the room. I have not turned around to see whether he has left.

The idea of that committee was not to fix rates but to meet on the general subject of insurance of reactors. Actually, it is a fact that rates for some years are going to have to be based upon what I will term informed judgment. They will have to be.

Chairman ANDERSON. I agree with you.

Mr. HAUGH. Now, the insurance companies are extremely interested in writing this business. We envision that in the future, atomic power is going to be used generally throughout these United States. Our function in the insurance business is to afford the necessary insurance. If there were only going to be five, and there were never going to be any more, there is just nothing in it. We don't expect that that is going to happen. Whether it is or isn't, we want to be in the picture. We want a reasonable rate, sir. We want an adequate rate; we are not trying to gouge anybody.

Now, I recognize that there may be wide differences of opinion as to what is reasonable and what is adequate, depending upon whether you are the fellow that collects it or the fellow on the other end. I recognize that that is true. But I assure you that everyone in the insurance industry—and I would expect that includes public officials—is seeking a reasonable answer to this thing, and a reasonable charge. But you simply cannot afford to give it away. It just isn't in the cards. There has to be some money collected, and over a long period of years there has got to be some money available to pay one of these things if it happens.

May I on one subject, just briefly, say this: There was testimony yesterday about legislation proposed to be introduced, and there were two alternatives. One was governmental indemnity above a given point. The other was governmental reinsurance. I would like, sir, if I might, to go on record as indicating that a governmental indemnity project is quite acceptable. It is my personal opinion, and I think it would be shared with the insurance people generally, though there may be some exceptions; I don't know who—that governmental reinsurance is neither feasible nor practicable; that it won't work.

Chairman ANDERSON. Now, tell us why. And what is the real difference? In the indemnity, the Government is picking up the check above $65 million. In reinsurance the Government is picking up the check above $65 million. Tell us the difference.

Mr. HAUGH. There is a tremendous difference. Let me, if I may, use the figures I understood to be used yesterday for the purpose of illustration.

As I understand it, it was illustrated for instance that the governmental reinsurance might be for $100 million in excess of the $65 million.

Chairman ANDERSON. No, we were talking about $450 million in excess of $50 million.

Mr. HAUGH. All right. I was too conservative. My argument is more forceful than it was before, then.

Let me use those figures. For $450 million in excess of $50 million, that means there must first be insurance, in order to reinsure. So that means, then, that the insurance companies, my syndicate, that has worked up $50 million coverage, is to issue a policy for $500 million. And we will look to the Government for reimbursement under reinsurance for $450 million.

Chairman ANDERSON. Not at all. Nobody has contemplated that at all.

Mr. HAUGH. That is the way I understand reinsurance to work, sir.

Chairman ANDERSON. It is a question of whether you are saying someone must issue a policy all the way through, whether you call it reinsurance or indemnity, if the Government says that after you have exhausted $50 million of insurance the Government then steps in to pay. That is all we were talking about.

Mr. HAUGH. Then this is not reinsurance.

Chairman ANDERSON. It is excess coverage.

Mr. HAUGH. Excess coverage. Well, I took the word "reinsurance" to mean it insures as you and I do it every day in the business. We issue a policy for a million and reinsure half of it somewhere.

Chairman ANDERSON. I want no part of that.

Mr. HAUGH. Neither do I, sir. That is what I want to stress.

Chairman ANDERSON. This is one member of the committee that will try to help you in that point of view.

Mr. HAUGH. Thank you. I wanted to make it abundantly clear that we don't want to issue a policy for larger amounts. We are liable in the first instance. When we go back to the Atomic Energy Commission or the Government and they say, "Our coverage is different than yours," that is no reinsurance.

Chairman ANDERSON. You must be discussing the AEC bill.

Mr. HAUGH. That is right, sir. That is what I was discussing, sir.

Chairman ANDERSON. It says that the Commission is also authorized that at any time within 10 years from the enactment of this section they can enter into agreements with private insurance companies for insurance coverage provided by them to any holder of a license.

Mr. HAUGH. That is exactly what I was speaking of.

Representative COLE. Why don't you like it? You throw up your hands, so I wanted to know. I know you don't want it, but I wonder why.

Mr. HAUGH. Let me go back again. I think, Senator Anderson, you will agree that on that phrasing the companies issue the primary policy and are reinsured by the Government. That means this. Let me use the same figures we were using before. I am not quarreling about amounts. But the syndicate has a capacity of $50 million. That is us. If they say we will provide reinsurance for a capacity of $400 million, they then, as I understand it, call upon our syndicate to issue a policy for $500 million. And we are liable in the first instance for $500 million, and we turn to the Government and say, "As we disburse it, will you please reimburse us?"

Now, I say this: To begin with, that means the primary liability of everybody in that syndicate of mine has now been multiplied by 10. Instead of $50 million, we are primarily liable for the amount in the policy, which would be $500 million. Most of the companies who subscribe to this syndicate could not assume that much liability under the law to begin with, and if they could they would not want to, for several reasons.

In the first place, it was made abundantly clear in that testimony that the coverage to be afforded under the reinsurance contract was not as broad as what we proposed to issue under the primary contract.

Now, how in the world are we going to issue a policy that says: "We give you coverage ths broad up to $50 million, and it shrinks down to here above that," and not get into a situation where we find the courts say, "Well, you didn't phrase it quite right. You are liable?"

But the Government says to me, "That isn't what we have reinsured. We are not liable." Mr. Cole, we can't get involved in any reinsurance contract like that. When we have reinsurance, the reinsuror follows the fortunes of the primary writer. He doesn't say, "Not this, and not that." He has to decide when he reinsures my company that he has faith in what I write, and he says, "What you write, I am on for this much." And he writes it. I cannot get involved in a case where I assume a much larger liability than I hope to be able to get from a reinsurer but may not be able to, on the premise that they did did not intend to cover that.

Representative COLE. That is what you are doing every day, is it not?

Mr. HAUGH. No, sir.

Representative COLE. What do you do when you reinsure?

Mr. HAUGH. My contract says my reinsuror follows my fortunes. He reinsures me.

Representative COLE. Are you not primarily responsible?

Mr. HAUGH. Yes, sir.

Representative COLE. And do you not run the risk of recovering from your reinsuror, whatever his commitment is? And are you not subject to the same disputed interpretations of his liability?

Mr. HAUGH. I have never had one come up.

Representative COLE. Well, you are subject to it. Could he not say, "Well, your interpretation of my liability is all wet. I don't agree with that at all"?

Mr. HAUGH. Mr. Cole, the day he did that, he would be out of the reinsurance business. Because every one of the people who buy reinsurance from him would say, "I can't afford to stay with you." In the reinsurance business you must either follow the fortunes of the direct writer or not write it.

Senator PASTORE. Why could you not do that by legislation?

Mr. HAUGH. I am talking of the legislation that was submitted, sir, and the legislation that was under discussion here yesterday did not do that.

Senator PASTORE. No. But I mean: What if you did? Why cannot you follow the fortunes even in drawing up your legislation, when you set up your fund of $450 million and state it in that policy that "We are bound by the same agreements that you are bound by"? Why do you make it so impossible in this case when it is not impossible in the usual practice?

Mr. HAUGH. Because then, sir, you have these additional obstacles that you run into if you go that far. If the Government is going to create a reinsurance company, it has to create and put in existence the funds necessary to take care of that and qualify in all the individual States. Because we have to, in order to be admitted to the States—if we assume a liability, "we," meaning any insurance company, a liability in excess of 10 percent of the net surplus, it must be reinsured in an admitted reinsuror. And that reinsuror must be qualified in each State in which we do business. And you are going to create a United States Government reinsurance corporation.

Now, I do not mind telling you frankly, sir, I am opposed to the Government going into the insurance business. I will be very outspoken about it.

Senator PASTORE. Are you not suggesting that?

Mr. HAUGH. No, sir.

Senator PASTORE. Well, all right. If you do not have the insurance that you are talking about, you get into this level between $50 million, which you are willing to put up, and the $450 million that the Government is going to put up, and first of all you are going to have 2 sets of rules. Because after all, the claimant will be the same. He will have to look to the private interest up to the $50 million. He will have to look to the Federal Government beyond that. He has got to stake two claims. He has to prove two claims.

Mr. HAUGH. No, sir.

Senator PASTORE. Why not? Who collects from the $50 million pool, and who collects from the $450 million pool, if it is not the same people?

Mr. HAUGH. I will say this, sir, that if there is an excursion, and it runs up to this, it is such a large sum that they have to collect from each category, it runs over the $50 million, and it gets into governmental indemnity, assuming that the Government undertakes to avail itself of the offer of the insurance industry to handle the processing of claims, all the claims would be processed before any were paid. Because I for one would not know where you began paying on insurance and where you began paying on Government. If it runs

over that amount, it is a catastrophe, and you are going to have to process all of them.

Along Mr. Cole's line, determine first: Does it run over the Government's obligation? They would all have to be processed.

As I envision it, after that has been done, so far as the Government is concerned, someone in the Government would have to finally approve any disbursement that was made by the Government. I do not know the mechanics of it, but there would have to be some governmental disbursing officer approving that.

The courts presumably would have determined if there was not enough to take care of all of it, how it was to be apportioned. But a person as I envision it would not file two claims. The claims would be completed and processed and established.

Senator PASTORE. In other words, if the damage was over $50 million, you would take your $50 million and dump it in a pool? And then wait for disbursements?

Mr. HAUGH. If the claim exceeded $50 million, then the governmental indemnity comes into the picture, and the claims would have to be adjudicated, I would think, before deciding which ones were paid in which order.

Senator PASTORE. And who would adjudicate the claim?

Mr. HAUGH. I would think the courts would have to. A referee. When I say "courts," I mean a referee. Some governmental body.

If the Government is going to step in and pick up indemnity, up to a point at which there is a limit, and your loss exceeds the limit of insurance, and the limit of governmental indemnity, at some point there has to be a determination. Either the Government will increase its amount of indemnification, or there will be some method of proration of losses. I see no alternative to those two, sir, if it should happen.

Senator PASTORE. Well, following your logic, then, what is really our objection to the insurance company covering the full damage, with the assurance, by proper legislation, properly drawn and enacted, that when the claims are to be paid, the Government will follow the risk as offered by the insurance company and pay upward of $450 million?

First of all, you have people who are experienced in processing these claims.

Mr. HAUGH. Yes, sir, we would be glad to.

Senator PASTORE. Second, you would follow a uniformity of procedure, because there are not two interests involved. And third, you would have the insurance by proper legislation to the effect that the $450 million would be forthcoming through legal procedures.

What is so wrong with that?

Mr. HAUGH. Here are the mechanics of what we in the insurance industry would have to go through in that event, sir.

This terrific excursion has occurred, and it is generally known it is going to hit the top of this $500 million. The insurance industry that day has to set up reserves of $500 million.

Senator PASTORE. Well, your reserve would be the United States Treasury; would it not?

Mr. HAUGH. If we had a check from them; yes.

Senator PASTORE. Your contract with the United States Government will back you up to the extent of $450 million. Who could doubt that? What better reserve could anybody have?

Mr. HAUGH. Let me make this statement, sir. This never reached the point where the dollars involved were sufficient to be awkward or embarrassing, but the principle is there.

During the war, a number of us insured many operations for the Government under regulations and under special rating plans. Of necessity, during wartime procedures, operations get slowed down. Things get slowed down here and there. Insurance companies are permitted to carry in their assets no amount of premium that is more than 90 days overdue. They cannot treat it as an asset. We have waited 6 months and 16 months to get our moiney, sometimes, from the Government. We could not treat it as an admitted asset.

I would not want to ever be put in a position where even if it were technical, I file a statement with some supervising official indicating that it did not comply with that State's rule as to how much surplus I had to have, even though I knew that eventually I am going to get the money, and even though they knew I was going to get the money.

Now, I am critical of no one. I am not crabbing at anyone. I am citing facts.

Actually, sir, what is done today in the field of reinsurance, in the event of a very substantial catastrophe: Normally, the reinsurance contract provides the direct writer first disburse the money and then is reimbursed by his reinsuror. Actually, if you got an extremely substantial one, and you found that awkward, a reinsuror would put up the money before you ever disbursed it, even though the contract does not call for that.

Now, governments cannot operate that way. I understand why. I know why they have to have rules and regulations and have to comply with certain things. I am not being critical. I cite it as a fact, sir. They cannot operate that way.

Now, you would get the same effect of what you are seeking without all those obstacles, if the Government were to enact legislation, indemnity legislation, leaving any insurance out.

Senator PASTORE. And indemnify whom?

Mr. HAUGH. Indemnify the people who are liable in the first instance, the people we would indemnify, the operator of the reactor. They are the people we would insure if we issued a policy even if the Government reinsured us. Our policy goes to the operator of the reactor and any other person having liabilities for it.

The claims are against them. Actually you don't ask them to pay it, and then reimburse them. The mechanics are: The insurance carrier processes the claims. It is against the ABC Power Co. They don't issue a check. The insurance company steps in and settles the loss.

Representative COLE. What is the difference in principle between the Government indemnifying the operator or the Government indemifying the carrier?

Mr. HAUGH. You bring in one more instance of who is to file his statement and meet the State requirements. The insurance company could technically be held to be not warranted to have its license continued in an individual State if its reimbursement was not paid on time. We just could not afford to be put in that position.

Senator PASTORE. Mr. Haugh, just so that we can line up our logic, all of your insurance companies have said that you do not want the Government to get into the insurance business.

Mr. HAUGH. Precisely.

Senator PASTORE. Now you are saying here that we ought to have a system of indemnification. Now, there can be no indemnification unless there is first payment.

These small private companies cannot pay off first and then wait for the Government to indemnify them. But you have gone so far as to suggest that possibly before the private interest does pay off, the Government will come in like an insurance company and pay off the claimant.

Now, why does that not put the Government in the insurance business?

Mr. HAUGH. I am saying this, sir——

Senator PASTORE. You are only using a different word to explain an insurance transaction. Somehow it is odious to hear the word "insurance" coming from the Government. I do not know what you are trying to prove by that. But then when you suggest your procedure, you are exactly suggesting an insurance procedure.

Now, by whatever name you call it, it is still a rose, is it not?

Mr. HAUGH. No, sir. I want to say this, in the first instance. I am not advocating any legislation. What I mentioned was this. There was legislation of two types, suggested types, proposed in the AEC report that was made yesterday. I stated, sir, I would like to go on record as indicating that our companies had no objection to what I will call indemnification, the indemnity approach. We do object to the reinsurance approach, for the reasons that I have cited. We object to being asked to have our companies put in a position of being responsible in the first instance for this loss and then having to look to the Government for reimbursement. That is the part we object to, sir.

Senator PASTORE. Yes. But if the Government is going to be responsible to the private interests that get into the reactor business, are they not going into the insurance business?

Mr. HAUGH. I would think not. And I say it for this reason. I endeavored in the prepared statement that I made to make it clear that the insurance industry is quite willing to afford its services for the processing of claims that might arise far in excess of this, if you are looking for someone to process the claims. I have heard the statement made by several witnesses in the course of these hearings that in agreeing with my own contention that has been made previously, that when you get out into the field you are talking of now, whether it be $500 million or $100 million or what, you are out of the field of insurance, sir. It is not an insurable thing. It is one of those things that might happen. It is extremely remote. You cannot get any reasonable average or let the law of large numbers come into play to hope that if it happens within any reasonable period of time, to secure actual leveling of premiums to get that loss into the premiums. It cannot be done. If it is to be taken care of, it is going to have to be in the nature, sir, of a contribution. That is what it amounts to.

Senator PASTORE. But your $50 million attaches to the same uncertainties as the $450 million.

Mr. HAUGH. It differs wholly in degree. I agree with you, sir.

Senator PASTORE. In other words, you are only picking up that proportionate part of a tab in case of disaster. Now, if these accidents, God forbid, will occur all over the country, that is something I don't

anticipate. You might have an isolated incident. Now, if you had a system whereby this was done by the procedures of the insurance company, whereby they would write the full insurance, with a fund set up that would be used in paying off the claims, I really don't see what serious objection there could be to it, because then you would be subjecting the whole process to a uniformity and to a practice that is well known in that particular field. And you would not have a claimant looking to an insurance company for a portion of his settlement and looking to the Government for another portion of his settlement. Because after all, if you are going to process your claims, the Government that is putting up $450 million is not going to allow somebody else to process their claims, either.

Mr. HAUGH. We don't insist on it. We merely offer our facilities, sir, for processing the claims. And I would think they would want to avail themselves of it, because it would frankly be an utterly impossible situation to try to create a claim organization to handle it.

Senator PASTORE. Well, if I may presume a little further, my suggestion, or the thing I am talking about, amounts to no more than that. In other words, this $450 million pool would be a rather ludicrous thing in the event of an incident, whereby the Government would step in with proper supervision, leaving it up to the insurance companies to handle it, and make sure that lawful claims were settled. Now, that is all it amounts to.

Mr. HAUGH. That part would be acceptable, sir. It is just that we do not want to issue a contract for these huge sums.

Chairman ANDERSON. I wanted to point out you were scheduled for 30 minutes and you have been on for an hour and a half.

Mr. HAUGH. I am sorry, sir. I did not want to take all of your time.

Representative COLE. It hasn't been your fault.

Chairman ANDERSON. Well, he said he had "one more observation." That is what ruined us.

Mr. Kelly?

STATEMENT OF AMBROSE B. KELLY, GENERAL COUNSEL, ASSOCIATED FACTORY MUTUAL FIRE INSURANCE COS.

Mr. KELLY. Mr. Chairman and members of the committee, I am Ambrose Kelly, general counsel of the Associated Factory Mutual Fire Insurance Cos. I should explain in the very beginning that I speak for only that group of companies.

You have just heard and listened with interest to Mr. Haugh's explanation of the views of this group of companies on the problems before you. I want it distinctly understood that I do not speak for the mutual atomic energy pool. I do not speak for the whole mutual insurance business. And Heaven and the stock companies know I do not speak for them. I speak only for our own group. I say that, because it seems to me there is a possibility that both in my prepared statement and in the answers to some of the questions the position of our group of companies may be somewhat at variance with that of other insurance companies, and I do not want you to feel that we speak for more than ourselves.

I should also mention, before I read our formal statement, that it was, of course, prepared before we knew of the proposals which were

put before you by the Atomic Energy Commission yesterday. It therefore says nothing whatever about them, and if you would like to know our views on any of the points which they have raised, I know you will exercise your prerogative of throwing at me such questions as you think are proper and helpful.

Senator Anderson, in an open letter dated April 25, 1956, has presented a brief summary of a legislative proposal which the committee offers as a basis for consideration at the hearings now being held. This proposal is put forward as a solution to the double problem of (1) providing protection to the members of the public who might suffer injury or loss to property as a result of an accident at a privately-owned atomic facility, and (2) at the same time providing protection to operators of such facilities and manufacturers of components and equipment used in them against the crushing financial blow which could follow if they were held legally responsible for such injuries and property damage.

When the Atomic Energy Act of 1954 was adopted, it was expected that private industry would be responsible to members of the public who might suffer loss through the operation of a privately owned reactor or other atomic installation, and that private insurance would be available in adequate amounts and at reasonable rates for those who wished to purchase it. Despite the efforts of the insurance industry, which has organized three separate pools or syndicates for atomic energy risks with a capacity far beyond that ever offered industry for any other type of risk, the lack of complete protection against crushing financial loss is a brake on our entire atomic power program. The problem was well summarized in the preliminary report on financial protection against atomic hazards made by the legislative drafting research fund of Columbia University in the following terms:

1. Despite all assurances that the probability of a catastrophic reactor accident is small, the possible consequences of such an accident are so serious that they cannot be ignored.

2. Under existing legal rules the reactor operator, and in some circumstances, other components of the reactor industry, may, in the event of a serious reactor accident, be subject to tort liability far beyond that ever previously imposed.

3. Although private insurers are expected to offer insurance coverage many times greater than that available to other industries, the magnitude of the risk is such that the potential liability cannot be covered by private insurance alone.

4. The reluctance of the reactor industry to proceed without additional coverage is a serious immediate threat to the vital national interest in the rapid development of atomic power.

5. As matters now stand, in the event of a serious reactor accident, the public, in large numbers, would probably have to bear a major share of the losses.

6. The Government has a basic responsibility not only to make sure that the reactor industry gets on with a vital job as quickly as possible, but also, in view of its special relation to atomic energy, to see that the risk of unprecedented loss is not thrust upon the public without adequate provision for relief.

And may I say here that after 2 days of hearings I feel that that summary of the basic problem, which was written before these hearings were held, is still valid. All you have done in 2 days of hearings is underline the basic concepts which were set out in that report. I think it is a great tribute to the job that was done at Columbia.

Senator Anderson, in his letter, indicated that the joint committee has in mind a double-barreled attack on the problem, offering a program of governmental indemnity above a reasonable amount of pri-

vate insurance up to a limit of $500 million and a Federal statutory limitation of liability to reactor operators and equipment manufacturers, which limit would represent the total of private insurance and governmental indemnity. Before commenting on this program, it might be well to outline the place of the factory mutuals in this picture.

Our eight companies are a group of mutual property insurance companies who are a major factor in the insurance of industrial property. Among our policyholders are many of the equipment and fuel manufacturers. I would say a substantial majority of them. We have already been asked to provide property insurance on several reactors, and we are members of the mutual atomic energy pool. We are, however, just as concerned over the possible exposure to loss of our other policyholders whose plants might be in the path of a fallout in the event of an accident. And we think that we, in this problem, can to some degree speak, as representatives of insured industrial risks throughout the United States.

As a result of our insistence on protection against ordinary perils in insured plants and our knowledge of how successful such efforts have been in reducing loss, we feel that a similar insistence on safe design and safe operating conditions, without compromise, will be equally successful in reducing loss at atomic installations. We cannot consider any indemnity program as making possible any short cuts which increase the chance of accident.

And I think we have had a very comprehensive program already outlined for seeing that these reactors are safe and are kept safe through inspections.

Chairman ANDERSON. Do you not think that the testimony of the Atomic Energy Commission indicated that they are insisting on safe design and safe operating conditions?

Mr. KELLY. I certainly do, Senator. And one of the things that I hope to bring in a little later is that I think every effort should be made in this program to see that there is not only a procedure under which no reactor can be operated until it has been approved by the Reactor Safeguards Committee, or other agency set up by the Atomic Energy Commission, but there is also, and we have found this in our field particularly important, a program of continued inspection and check on those reactors. You must not only see that they were properly designed but that personnel is properly trained, that it knows the emergency operating procedures that are to be followed, that the containment on which we are depending so heavily here is maintained intact, and that it will function as intended after a loss. In other words, we put an automatic sprinkler system into a building, or rather our policyholder does. That is fine. And we know that that sprinkler system will protect against loss. But we also know that there has to be a procedure for outside inspection of that sprinkler system at regular intervals if you are going to be certain that it will operate. In other words, we feel that we cannot emphasize too strongly the safety aspects of this problem, and of course we feel that the public utility industry, that if the safety questions are all fully answered the rest of the problems dissolve in thin air.

As private insurance companies, we cannot contemplate a Government indemnity program in the atomic-energy field without some regret. However, in this case there is no alternative. We would sug-

gest, however, that in enacting any program your committee be guided by the following principles:

1. The national interest required the development and use of nuclear reactors for defense, for power, and for research. The public must be protected, as far as possible, against injury or loss as a result of an accident at such installations and indemnified if such loss occurs.

2. Governmental indemnity should be applicable equally to both Government and private atomic installations, with privately owned installations obliged to provide liability insurance in an amount established by the AEC as adequate for all normal losses within the capacity available from private insurers.

And I might say that the one new thing which I learned in these hearings is that at the present time the public in the United States is, in my judgment, inadequately protected against the possibility of loss resulting from the type of incident or accident we have been discussing at an AEC installation. Counsel for the AEC in his testimony brought out that under the Federal Tort Claims Act there were many defenses which might be available to the Government under the discretionary function, and he felt that it was unlikely that you would be held liable in the event of such an incident. At the present time, therefore, the protection available to the public comes entirely from the indemnity agreements which have been made by the AEC, and which have been discussed, under which the AEC agrees to indemnify the private contractors who are operating your AEC installations.

In the event of the type of incident of the kind that has been discussed ever since we started on this point, at a Government installation, it would therefore be necessary, as I understand it, for the private contractor to defend these cases. There would be no possible settlement as soon as damages could be ascertained. It would instead be necessary for the damaged party to prove, through any of the means that have been discussed here, either in a court case or in a hearing before a referee, the extent of his damage, and secondly, that liability, tort liability, rested upon the contractor. If it should be proven that the actual cause of the accident was not due to any negligence on the part of the contractor but instead was due to components or personnel who were working for the AEC, then all of the defenses under the Federal Tort Claims Act would be operative.

I suggest to you gentlemen that in your study of this problem, which is the problem of protecting the public in the event of an accident at a privately owned reactor, you may have uncovered perhaps a weakness in the protection available to property owners and people in the United States in the event of an accident at an AEC facility.

Senator PASTORE. Now, before you go any further, Mr. Kelly, will you amplify the meaning of the last sentence in section 2, or the last portion of section 2, as to providing liability insurance in a amount established by the AEC as adequate for all normal losses within the capacity available from private insurers.

What does that mean?

Mr. KELLY. You may have noted there that I was careful to avoid the $65 million, the $50 million, or the other figures which have been mentioned. Because I realize that in many of these cases the amount of insurance which will be available will be affected by perhaps other prior commitments already made by these pools.

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Now, we have talked about the total capacity which they will have. On third party liability the figure most commonly used is $65 million. It is of course understood that in all those cases both pools are depending upon reinsurance. In this case, reinsurance which will probably be basically afforded by the London market, but may be furnished by other reinsurance markets as well. It may be that some of that reinsurance capacity is not available on the particular reactor.

Take the mutual pool, which is going to be operating in both the property damage and the third party liability field. It may be that as Mr. Haugh mentioned, the capacity of the mutual pool has already been used for insuring the reactor itself, so that there is at this time no capacity available. It seemed to us that you could not require liability insurance which was not available or was not within the capacity available from private insurers.

Chairman ANDERSON. I just wonder, there, if you are quite correct in aying that that $50 million depend upon the London market. If you bring it down to the average company, a company might be carrying $25,000 of this risk. He probably would not have to reinsure that.

Mr. KELLY. You see, some of the companies, Senator Anderson, that are assuming liability are assuming it in much larger proportions than $25,000.

Chairman ANDERSON. Yes, but they have much larger retention capacity.

Mr. KELLY. Mr. Haugh, who of course is here, might enter into this. It is my understanding (and what I have learned about the stock company pool I have learned principally from the articles on it which have appeared in the insurance press) that the companies which are participating in the pool have been asked to commit themselves for two lines, a gross line and a net line, and that the gross lines when added together would give the $50 million capacity which has been discussed; that the net line, which is the amount they would retain, is somewhat substantially less than that. And it was the hope of the pool that in these cases where full capacity was needed it would be possible to secure reinsurance which could be effected through treaty covering all the members.

If Mr. Haugh is still here, he is much more competent than I am on this point.

Chairman ANDERSON. Could you clear that point, very briefly, now, Mr. Haugh?

Mr. HAUGH. Yes. It is hard for me to be brief, of course. In the pool it is contemplated that there will be some reinsurance, but the reinsurers will be in on each risk just as the direct writers are. Each member subscribing to the pool subscribes for a net amount which he will retain, and authorizes the syndicate to use a capacity equal to double the amount of that authorization.

Now, actually, that is to take care of more than just what Mr. Kelly mentioned, about bringing in foreign reinsurers. It also takes care of companies that may not be licensed in a particular State in which a reactor is located, to enable us to handle the mechanics.

Chairman ANDERSON. Do you think the market may not be there for the reinsurance, that it may be necessary to come up to the guaranty?

Mr. HAUGH. No, sir. It is expected to be there for every risk. It is not a case that it may be in for this risk and may not be for that. It is right across the line.

Chairman ANDERSON. What I am trying to ask is this: We have been talking here about $50 million. Are you confident that $50 million will be available whether the London market is available or not?

Mr. HAUGH. I am confident from word that I got from London that it will be available. That is why I am confident that I will have the $50 million. We have the authorization. Put it this way, Senator. We have the authorization from American companies for total amounts exceeding $50 million. The understanding of those companies is that parts of that will be reinsured, not more than 50 percent of what they have in the foreign market. That perhaps answers your question, sir.

Chairman ANDERSON. As you know, Mr. Kelly, we all have to go to that London market once in a while, and sometimes to the Swiss market.

Do you mind saying who belongs to the factory mutual group?

Mr. KELLY. The factory mutual group consists of eight companies. Three are located in Rhode Island, Senator Pastore's home State. Three are located in Massachusetts. One is in Philadelphia, and one in Chicago. They have no association with the general writing companies, such as the Kemper group or the Lumbermen's at Mansfield, or the Central. They specialize in industrial properties and in fire prevention.

Chairman ANDERSON. Is it the group that also specializes in sprinkler risks?

Mr. KELLY. Yes. The bulk of our business is sprinklered. It is a rather unusual organization. We will discuss it at some time privately, and I'll give you our full plug.

Representative COLE. While you are discussing it publicly, would you tell us who are in the mutual atomic-energy pool in addition to the factory mutual companies?

Mr. KELLY. In addition to the factory mutual companies, the major components of the mutual atomic-energy pool are the large mutual casualty companies. These are such companies as the Liberty, the Lumbermen's Mutual Casualty, the American Mutual Liability, the Employers, and the like. I believe Mr. Yount, of Liberty, is on your list to testify later. In addition there are a large group of fire insurance mutuals writing general insurance who are also members of the mutual atomic-energy pool.

Chairman ANDERSON. Mr. Haugh indicated that an attempt had been made to reach nearly all of the private writing companies. No attempt was made to reach the mutual companies?

Mr. KELLY. I believe a rather comprehensive attempt was made to reach all the mutual companies, fire and casualty. The mutual pool was organized through the American Mutual Reinsurance Co., and if they missed sending your company an invitation to join, Senator, I am sure they will be glad to remedy it tomorrow morning.

Chairman ANDERSON. I was just beginning to feel bad.

Mr. KELLY. But as I understand it, they turned first to those companies that had been active in the pools of the American Mutual

Reinsurance Co., that was organized by the mutual insurance companies some years ago.

Representative COLE. Mr. Haugh indicated yesterday that about 90 percent of the stock companies were in the stock pool syndicate. I would like to learn if possible what the percentage might be with respect to the mutual corporations.

Mr. KELLY. I would say that those companies in the mutual field who have roughly 90 percent of assets and surplus, perhaps a little less, because we have some unusual carriers, like the perpetuals, who have very large surplus, who would not be interested in this, but I think 90 percent is probably a good rough estimate in the mutual field as well. Whether or not the capacity could be expanded at a later time—of course, I think it is entirely possible. That will be not through bringing in new companies, so much, Congressman Cole, as having the companies that are currently members of the pool accept a larger participation.

Now, it being new, I think the companies have been somewhat conservative in their commitments. And you can, I think, well understand that they would be.

3. In the event of loss at a private installation which has private insurance, the Government indemnity program should apply only after private insurance has been exhausted. The Government should turn the handling of claims over to the private insurer on the particular risk, thus avoiding the necessity of establishing a claim organization of its own.

4. The indemnity program should be applicable to all property, except the reactor itself and associated equipment. And we mean, I think I should add to that, that we hope that you would include direct damage to other property owned by the reactor operator.

Let me illustrate that very quickly. We have talked during the last 2 days about several of the research reactors at various schools and colleges. Now that reactor will be separately insured. There will be perhaps private liability insurance on it. There will be property damage insurance written on it. And you might have the Government indemnity program applying above the private insurance on third-party liability. If an accident should occur at one of those reactors located on the campus, the property most subject to possible damage is the property of the college itself, not the reactor but its dormitory buildings, its lecture halls, its auditoriums, its gynasiums, perhaps its stadium and its playing field, all might be in the path of a fallout and therefore suffer very substantial damage. In contemplating insurance against contamination from radioactive material, we think you need to have in mind the fact that the reactor operator will need protection, indemnity protection, on his own property outside of the reactor.

I can think of other very large corporations. We have been asked to insure one where they are building an experimental reactor. It is in a separate building, but within the immediate neighborhood are millions of dollars of property of that corporation. In the event of an accident at the reactor, the property most exposed to damage would be the property of the corporation itself.

One educational institution, which is of primary concern to us, because we are carrying its insurance, is the Massachusetts Institute of Technology, which is contemplating a reactor which will be on the

campus at Cambridge. In the event that there is a loss at that reactor, they need protection on their other property located in the same area.

5. No atomic installation should qualify for the program unless its design has been approved and the installation, when completed, has been subject to a thorough inspection before being activated—with a continuous inspection program thereafter.

6. The license fee—and this gets down to the question of premium for the Government indemnity program, which we have heard discussed very often. We have very definite ideas on that. We think it should be sufficient in amount to finance an adequate program of inspection for all covered installations. In others words, we do not contemplate this being considered as an insurance premium intended to build up reserve funds at all. We think of it merely as a fee which is being paid to finance the inspection and safety research being made by the AEC in this field.

7. Any bill passed should express the intent of Congress to provide such Government indemnity only as long as necessary. The situation should be reviewed at regular intervals of no more than 3 years, and a report made on whether or not is may be discontinued.

A specific question has been asked in Senator Anderson's letter on the range of rates to be charged by the private insurance industry. The factory mutuals are members of the Mutual Atomic Energy Pool whose committees are now struggling with this difficult problem. We are therefore today in no position to provide any answer to these questions until these committees have reported.

Chairman ANDERSON. Any questions, Mr. Cole?

Representative COLE. I simply would like to ask Mr. Kelly to explain the difference between the mutual syndicate and the stock syndicate. Is the mutual going to insure property only, and not lives?

Mr. KELLY. No; it expects to insure both, Congressman Cole.

Representative COLE. Is there any syndicate of syndicates?

Mr. KELLY. There is not. In other words, it has been anticipated that you may have a situation in which 2 of the syndicates are insuring the same risk, or perhaps all 3 of them might be.

For example, let us assume a reactor such as the one that Mr. Searing is proposing to build at Consolidated Edison. And let us assume that the property damage on that reactor was divided between the mutual syndicate and the stock fire syndicate, which is writing property damage. The stock group might write, say, $40 million, and the mutual group might write $5 million if the total insurance they needed to replace it in the event of damage was $45 million. At the same time they would wish to have third-party liability insurance. The stock party syndicate could write its full $50 million on the third-party liability insurance on that same risk. But the mutual syndicate would only have available not the $15 million, which is its presumed total capacity, but $10 million, since $5 million was already committed on the reactor itself.

You would then have a cumulative total of insurance in private companies on that single reactor of $115 million. And in the event of a loss at that reactor, the insurance business would have to pay out from its funds $115 million if it were a total loss to both property and liability.

Representative COLE. I do not understand why there is not and why there should not be an association composed of these groups who are

participating in atomic energy insurance, irrespective of the legal nature of the participants.

Mr. KELLY. Congressman, your suggestion makes excellent sense. What you are dealing with, however, are, shall I say, the ingrained prejudices of the business.

Senator Anderson, who has been in it, knows thoroughly that there has been from the standpoint of the public a healthy competitive situation, and from the standpoint of the business a bitter competitive situation between stock and mutual companies.

I think that if you had such a syndicate which was a syndicate of syndicates, if you want, or if you had only a single syndicate to which we all belonged, you would obviously do a better job of mobilizing the capacity of the business. But it would then be necessary for all of these people who have had different ideas over a long period of time to merge those different ideas, to agree on a single management, to agree on a single set of principles.

For example, suppose the mutual companies felt, as they very well might, that in the event the rates established under the program provided a surplus over losses and expenses, the margin should be returned to their policyholders, as they would in ordinary business. The stock companies would regard that as treason to the profit system on which their business has been built.

Representative COLE. A syndicate of syndicates would not destroy these conflicting philosophies; would it?

Mr. KELLY. I do not know that it would. And I have felt that your proposal, as I said, makes sense. We have, however, on the stock company side two pools—and I say this is in no sense in criticism, but there it was felt that a more efficient job could be done by setting up two separate syndicates so that each of them has roughly $50 million in capacity.

The three groups will I am sure work closely together. They are in constant touch with each other. I know that is particularly true between the stock casualty group and the leaders on the mutual casualty side, who have been heading up the committees of the mutual pool working on liability. On the property damage side, I know that meetings are being scheduled between liaison committees of the two groups, so that there may be an interchange of ideas with reference to form and rate, so that we can learn from them, and perhaps they might even learn a little from us. But that seems to be as far as the business is presently prepared to go.

There is this one thought that I wanted to leave with you. If we go on the basic assumption that the Government in the atomic energy field has a responsibility to protect the public, and if we also go on the basic assumption that the precautions taken in design and inspection make the possibility of a catastrophe loss low, and that loss will only occur when you breach the containment, it seems to me that many of the problems which you have discussed over the last 2 days could be tremendously simplified by having the Government indemnity program attach at the point where the catastrophe loss occurs, which is where you breach the containment. If up to that point you left the liability to be handled by the private carriers, the capacity required would be quite modest. As a matter of fact, probably a policy with a limit of a million dollars, which would not even need syndicate handling, would be adequate for the protection of the manufacturer.

But that could only be done if your statute specifically placed a liability on the Government, as a condition of the fact that it licensed the reactor and was continually inspecting it.

In other words, and this is a point which I think is also true on your AEC installations—if you by statute made the Government liable for any damage to person or injury to property, which was the result of an accident or incident at any reactor, private or public, and then required private insurance up to an amount adequate to handle the normal loss, many of the problems which have plagued us all here would disappear.

Now, whether it is possible or practical, whether you think well of it, or not, it is a new idea, and it would have to be kicked around a great deal.

Chairman ANDERSON. If the Government assumes responsibility, because of the improper performance of something which it has licensed and then inspected and carried that very far, you would very quickly have a city that has licensed an elevator in a big building, and regularly inspects it, assume responsibility in case that elevator fell.

Mr. KELLY. You are saying, Senator, that we would be creating a precedent which if carried into other fields would be very troublesome. You are entirely correct. But throughout this program you are facing the fact that the unique nature of atomic energy makes it necessary to take new steps. Your whole concept of liability here, the inedmnity agreements which the AEC has made with contractors in the atomic energy field, are not made with contractors building airplanes or building tanks or building buildings for the Government in normal course. In other words, you are faced with a situation in the atomic energy field where we have a great new force whose power is tremendous and which scares us to death.

Chairman ANDERSON. We started building the Shippingport reactor, and nobody worried about it. We set up a reactor out at Arco and nobody worried about it. We have one up at West Milton, and there is nobody worrying about. Nobody is worrying. Nobody has threatened to move out. Now, just all of a sudden, we have something that is so dangerous that nobody can live with it.

Mr. KELLY. We have a force which, if it escapes from the chains we have forged to hold it, can do a tremendous amount of damage.

As I said earlier in my remarks, and I meant them not at all in criticism, I feel that at the present time, if you and the AEC believe what was testified to, by your own experts yesterday, and if, as Mr. Cole brought out, the machines which are being operated by the Government today far exceed in size and capacity those contemplated under the power program, there is the possibility of a tremendous loss. If these things can happen at a private reactor, they can happen at a public reactor. Just think of the legal situation we are going to be in if it should happen. And God knows we all hope it doesn't, at any one of the AEC's own installations.

You would have these very same problems of claim handling, of contamination of property, of injury, or long pending suit, without adequate provision made for it. And I for one doubt that there is adequate provision yet made for it in the statutes which you have.

Chairman ANDERSON. Are there some questions?

Thank you, Mr. Kelly, very much.

Mr. Lindseth?

You are like the pitcher called into pitch the ninth inning of a doubleheader that has run for 5 or 6 hours.

I am sorry we did not get to you before.

STATEMENT OF ELMER L. LINDSETH, PRESIDENT, CLEVELAND ELECTRIC ILLUMINATING CO. AND MEMBER, EDISON ELECTRIC INSTITUTE COMMITTEE ON ATOMIC POWER

Mr. LINDSETH. My name is Elmer L. Lindseth. I am president of the Cleveland Electric Illuminating Co., a member of the Edison Electric Institute committee on atomic power, and a past president of the institute.

I am appearing today on behalf of the institute in response to Chairman Anderson's letter of April 26. Chairman Anderson's letter was considered by the committee on atomic power of the institute, which comprises 14 member company executives, and this statement today has been authorized by that committee. The names and business affiliations of the members of the committee are appended to this statement.

The member companies of the Edison Electric Institute serve 93 percent of the electric customers receiving service from the investor-owned electric utility industry, which, in turn, serves approximately 80 percent of the total number of electric customers in the United States. The fact that such a large majority of the American public is supplied with electric service by the investor-owned utility companies imposes a very great responsibility upon our industry to use its best efforts to the end that any benefits arising from new or improved methods of producing electricity will be made available to that majority.

As these figures indicate, our industry is a large one, and a very important one to the welfare of the country. However, notwithstanding our aggregate size, I wish to point out that we are essentially an industry made up of a large number of companies which are relatively small by today's standards. For example, the Edison Electric Institute comprises 186 domestic operating companies.

The largest investor-owned electric utility in 1955, as measured by revenue, had electric revenues that were less than 4 percent of the sales of the Nation's largest automobile manufacturer. It is because our industry is made up of so many small units that it has become essential that certain important projects be tackled by groups of companies rather than by individual utilities. It is for the same reason that the large potential risks—remote though they may be—that are inherent in the atomic program must be measured against the fact that most utilities are companies of relatively small resources.

Atomic energy for power production has moved rapidly to the point where it is of extreme importance to our industry. It is a subject that is taking priority with many of our top executives whose companies are devoting manpower and dollars to its research and development on a sound and solid basis, notwithstanding the unattractive economic outlook at the present state of the art.

As I have previously pointed out to this committee, a total of 44 investor-owned companies are singly or in groups participating in building nuclear powerplants, and more than 300 million free enterprise dollars are involved in the planning and construction of nuclear powerplants and attendant research. The plants to be constructed

with these funds will have a capacity in excess of 1,100,000 kilowatts. There are 104 utility companies actively participating in the atomic field. The latest announced development in our progress occurred just this month when AEC granted permits to Consolidated Edison Co. of New York and the Commonwealth Edison group authorizing the beginning of construction of large-scale nuclear powerplants.

As an industry, we sincerely believe that the positive action our member companies are taking toward development and construction of full-scale nuclear power reactors is very much in the national interest, for reasons with which all of us, I am sure, are familiar. These range all the way from seeking ways to lower power generation costs and expand our own domestic fuel sources, to helping our country maintain world leadership in the peacetime atomic energy program and enabling it to help other countries who are far less fortunate as to fuel sources. Our member companies were encouraged by passage of the 1954 act, allowing broad participation by private industry in the peacetime atomic energy field. In the past we have signified our intention to take the lead in this field and to do a job of which America can be proud. Today I wish to reiterate our intention to continue to go forward with a businesslike, constructive program that will meet the requirements of our Nation in the most orderly, economic, and efficient manner.

The subject of today's hearings—"Governmental indemnity or insurance program to supplement private insurance covering reactor hazards to the public"—is of vital concern to our industry. The principal problem is whether residents in the communities where the plants would be located would be subjected to significant potential hazards, even though remote. We are confident that such potential hazards will be decidedly minimized as a result of the efforts which both industry and the Atomic Energy Commission are making to assure that nuclear powerplants, wherever located, will not be hazardous to the surrounding areas.

Although the experience to date in reactor operation has been favorable, there is a decidedly limited history of experience, either as to operations or potential hazards, available to us or to the insurance industry against which to measure potential risks. That is the principal reason that today's problem is before us. Nevertheless, it is apparent that catastrophe insurance or indemnity coverage must be available to cover the potential hazards, remote as they may turn out to be.

It is the opinion of the EEI Committee on Atomic Power that a formidable roadblock in the path of nuclear power development by private industry will result unless participants in the atomic program will be able to obtain insurance or indemnity protection in what may be termed adequate amounts to cover potential accidents of the type I have mentioned above. It is my understanding from statements of representatives of Government power that atomic power development by cooperatives and certain types of governmental power groups such as testified to by Mr. Schacht will be similarly blocked if adequate coverage is not obtainable.

The problem we are discussing is one of indemnity coverage, to which a solution must be found. With respect to specific reactor plants, it is our understanding that representatives of several investor-owned electric power companies or groups of companies are being

heard by the Joint Committee during these hearings. These are power companies and groups that have made plans for the construction of nuclear powerplants under licenses from the Atomic Energy Commission. It is the hope of our committee that the specific comments and observations of these utility companies, which have been devoting both research dollars and manpower to nuclear studies, including the problems of reactor safety and control, will be of considerable help to the Joint Committee on the particular subject of insurance and indemnity.

Chairman Anderson's letter solicits information on the probability and extent of damage together with information on safety standards and practices.

Since these are largely a function of individual reactor type and design, our committee feels that generalized answers would be far less helpful than specific case studies based on individual reactors. Since other representatives of our industry and its member companies are being heard on this subject, our committee submits no specific opinions on these items.

We would, however, like to state unequivocally that in our opinion no utility company or group of companies will build or operate a reactor until the risk of nuclear accidents is minimized. Our industry has for 75 years been confronted with potential hazards from high-voltage electricity and high-pressure steam plants. Yet our record of safety to employees and the public over the years indicates that proper design, construction, and operation precautions can minimize such potential hazards. However, our committee does wish to state on behalf of the institute that in the absence of adequate coverage of the reactor risk from insurance companies, the institute endorses the concept proposed by Senator Anderson of limiting the liability of the reactor owners and operators to their private insurance coverage, and providing a governmental indemnity over and above a reasonable amount of public liability insurance provided by the private insurance industry. The Government indemnity would serve to supplement private insurance coverage unless and until such time as adequate coverage can be obtained from private sources. We view this as necessary on an interim basis to assure that current and near future reactor projects can be carried through to completion. It is our view that if, when, and to the degree that adequate coverage becomes available from insurance companies, any supplemental Government indemnity coverage would be reduced. In the opinion of our committee, the enactment of legislation providing such indemnity would accelerate the development of atomic power.

On behalf of the institute, I would like to express again our appreciation for the privilege of testifying here today. I should like also to record that we have noted that following these hearings on insurance, the Joint Committee intends to hold hearings on the civilian reactor program and legislative proposals for its acceleration. The institute, whose member companies contemplate spending hundreds of millions of dollars on this program, is deeply interested in this question. We respectfully request an opportunity to participate in these later hearings.

Chairman Anderson. Thank you very much for that statement. I am sorry you were a long time getting an opportunity to give it, but we are nonetheless very happy to have it, because you do represent

a large share of the electrical industry in this country, and we are very glad to have your comments.

To return now to this very last suggestion on the last page, certainly we will so arrange the schedule that you will have a chance to be heard on this discussion of the Gore bill, and we will try to get to you at the start of the session, so that we even up the bitter with the sweet and do not make you stay a long time.

Representative COLE. I was just wondering to what extent Mr. Lindseth and this group share the concern voiced by Mr. Cisler with respect to other problems, other stones that are on the road of this atomic energy development. I have in mind the utility holding company limitation and the tax treatment of expenditures made by companies in this field.

Mr. LINDSETH. Both of those subjects are matters of very great concern to our industry and of importance to the program. The president of the Edison Electric Institute, Mr. Branch, testified in the hearings on the Pastore-Potter bill and reflected the opinion of our industry that the restrictions under the Holding Company Act, if extended to all members of groups of utilities otherwise not subject to the Holding Company Act, would be seriously restrictive of progress.

The imposition of the restrictions of the Public Utility Holding Company Act on nonutility companies, solely by reason of the fact that they were participants in a reactor project, would certainly foreclose them from any participation.

The tax matter is an extremely complicated one.

Representative COLE. Well, in the tax matter, you do not seek legislation, I understand.

Mr. LINDSETH. Not until and unless all normal processes before the Bureau would have been exhausted, and still there should be a roadblock.

Representative COLE. If the ruling of the Internal Revenue Bureau does not meet with your satisfaction, then it may be necessary to seek a change in the law.

Mr. LINDSETH. Well, not exactly would the test be "if it were not to be to our satisfaction." But if it were a roadblock in the furtherance of the program, yes. It is the case, for the record, that for the syndicate known as Atomic Power Development Associates, which is a research and development syndicate associated with Power Reactor Development Corp. in the Detroit project, the Bureau has ruled that payments by member companies into Atomic Power Development Associates are normal expenses in furtherance of research and development, and deductible in the year in which made.

Representative COLE. You say that ruling has been made?

Mr. LINDSETH. That ruling has been made by the Bureau, in furtherance of research and development. The corresponding group, Power Reactor Development Corp., which will own the hardware, so to speak, the capital assets to which the chairman referred this morning, of the reactor company—that tax ruling has been sought, as Mr. Cisler has stated today, but has not yet been forthcoming.

Representative COLE. Any contribution from that group would come directly from the constituent members, rather than from the research syndicate.

Mr. LINDSETH. The entire project is really two parallel projects, not dissimilar from the relationship in the Chicago group. That is, the Atomic Power Development Associates is a group of 41 companies in furtherance of research and development leading to the fast breeder reactor. Those payments by member companies have been declared by the Bureau to be in furtherance of research and development and deductible expenses in the year made.

The other side of the coin is the syndicate known as Power Reactor Development Corp., which will build, own, and operate an actual physical reactor. Up to now, the Bureau has not acted on an application.

Representative COLE. Where does it get its funds?

Mr. LINDSETH. It gets its funds from the contributions of members. It is a membership corporation, nonprofit, organized under the laws of the State of Michigan, awaiting a tax ruling that its contributions will be deductible when made, as distinct from the complex situation of the issuance of membership certificates, which, at some later date, may, if proved worthless, become a tax-free deduction at the expiration of the life of the physical plant to be built.

Development Corp., which will build, own, and operate an actual

And therein is a very distinct difference between a syndicate proposal, such as Power Reactor Development Corp., a nonprofit membership corporation issuing certificates—if that is the term of membership—as distinct from the Chicago reactor, which is to be owned by a single utility as physical assets commingled on the books with all other assets.

Similarly, in New York all of the physical assets of that reactor will be owned by a single corporation, Consolidated Edison Co., and commingled on the balance sheet and other figures with the other assets of the corporation.

The Detroit reactor will belong to a nonprofit corporation, with a substantial number of members. And the evidence of ownership will only be a membership certificate if a certificate is actually issued in a nonprofit corporation. And the asset there which a member company has is a membership, as distinct from an asset, which Consolidated Edison has, which is bricks and mortar, and the asset which Commonwealth Edison will have, which is bricks and mortar.

Chairman ANDERSON. You will have to admit that the Detroit plant will also be bricks and mortar.

Mr. LINDSETH. It, too, will be bricks and mortar. The plant will be bricks and mortar, the property of the membership corporation, and not the property of any utility. And therein lies a distinct difference in the handling of the Detroit project from the New York or Chicago project.

Chairman ANDERSON. Thank you very much.

We will meet again in this room tomorrow at 10 o'clock.

(Whereupon, at 5:17 p. m. Wednesday, May 16, 1956, a recess was taken, to reconvene at 10 a.m. Thursday, May 17, 1956.)

GOVERNMENT INDEMNITY

THURSDAY, MAY 17, 1956

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee on Atomic Energy met, pursuant to recess, at 10:15 a. m., in room P-63, the Capitol, Hon. Clinton P. Anderson (chairman of the joint committee) presiding.

Present: Senators Anderson (presiding) and Pastore; Representative Patterson.

Present also: James T. Ramey, executive director, George Norris, Jr., George E. Brown, Jr., Wayne P. Brobeck, and David R. Toll, of the joint committee staff.

Chairman ANDERSON. The hearing will be in order.

The first witness this morning is Mr. Gale, chairman of the Commonwealth Edison Co., Chicago. Mr. Gale, we are very happy to have you here and happy to have a chance to get your views on the problem of insurance. We realize that you are trying hard to build a plant. We are happy to try to help you.

You may proceed.

STATEMENT OF WILLIS GALE, CHAIRMAN, COMMONWEALTH EDISON CO., CHICAGO, ILL.

Mr. GALE. I am grateful for your invitation for me to appear here today to discuss the interest of Commonwealth Edison Co. in a program to cover possible reactor hazards to the public.

When I appeared here on February 16 of this year, I discussed the history of our nuclear power project in some detail. As you know from that testimony, the plant we propose to build about 50 miles southwest of Chicago will have a capacity of 180,000 kilowatts—the largest all-nuclear plant yet scheduled. It will be a boiling-water reactor—a principle advanced by Argonne National Laboratory—and will be built by the General Electric Co. for $45 million.

One-third of the $45 million contract price, or $15 million, is being paid as a research and development expense over a period of 5 years by Nuclear Power Group, Inc., on behalf of the 8 companies comprising our atomic power research group. The remaining $30 million, plus the cost of the site and overhead costs, will be paid for and capitalized by Commonwealth Edison, which will own and operate the plant.

Because of the research contributions by our associates and because of General Electric's favorable contract price, we were able to go ahead with this project without a request for governmental subsidy. Our contract with General Electric calls for completion of the plant on or before December 8, 1960.

Our research associates are American Gas & Electric Service Corp., Bechtel Corp., Central Illinois Light Co., Illinois Power Co., Kansas City Power & Light Co., Pacific Gas & Electric Co., and Union Electric Co. Commonwealth Edison's share of the $15 million of research cost is $2,833,334.

So much for background on our project.

I would now like briefly to restate the substance of my February 16 testimony.

I said that we expected that a construction permit and an allocation of nuclear fuel would be granted soon by the Atomic Energy Commission; that this would leave only one major hurdle to be solved—the problem of insurance. As you now know, we reveived our construction permit and fuel allocation on May 4.

I expressed confidence that the private insurance industry would be able to work out satisfactory coverage for primary third party liability as well as coverage for the plant itself.

I stated that, in my opinion, it was important for Congress to salve the problem of third party liability from a major nuclear catastrophe.

I would like again to point out that it is our firm belief that the likelihood of a major nuclear incident is extremely remote. However, if one should occur, the potential damage might be extreme. That is why it is so important that the Congress solve this problem. It is equally important that the problem be solved soon. This, in our opinion, will be strongly in the national interest.

Some of our leaders tell us that there is grave danger that other countries may forge ahead of us in the development of atomic power. We believe that private industry can help keep America in the forefront of this development. We are anxious and willing to do our part.

The national interest is of the utmost importance in this matter. To be sure, Commonwealth Edison wants to keep abreast of all new developments affecting our industry. However, the need for speed in the development of atomic power know-how is not a need of the electric utility industry alone—it is a national need.

So I repeat that the speedy solution of the insurance problem is in the interest of all the people—not just the electric utility industry.

In this connection, I should point out that we expect to continue to build and use conventional generating facilities for many years into the future. For example, between now and 1960, the scheduled completion date for our nuclear plant, we will install more than a million kilowatts of coal-fired generating capacity. When and if economically feasible, however, we expect to provide for an increasing part of future load growth through installation of nuclear facilities. The sooner that full-scale atomic power plants are built, the sooner we will find out how to make them competitive with conventional plants.

Chairman ANDERSON. To put it another way, Mr. Gale, you are going to develop 180,000 kilowatts of nuclear power and a million kilowatts of new coal-fired generating capacity between now and 1960?

Mr. GALE. That is correct.

Chairman ANDERSON. And you anticipate that that ratio will change some of if it proves to be reasonably competitive?

Mr. GALE. I think increasingly, if it proves to be competitive, that nuclear power will begin to move into the field.

Chairman ANDERSON. But this is a pretty concrete answer to our friends in the coal business who are curious to know whether atomic fuel might put them out of business. Instead of putting them out of business, you are going to give them a million kilowatts more in your plant alone.

Mr. GALE. Yes, sir.

Senator PASTORE. May I interrupt you here?

Mr. GALE. Yes, sir.

Senator PASTORE. I might be anticipating. If I am, you just stop me. Does your company come under the Public Utility Company Holding Act?

Mr. GALE. No, sir.

Senator PASTORE. Do you anticipate you might have to apply for exemption?

Mr. GALE. No, sir. You see, our plant is being owned directly. It will be just a part of the Edison system like any other plant.

Senator PASTORE. How about your associates?

Mr. GALE. Our associates are making research contributions. They do not have any ownership.

Senator PASTORE. So you do not have that problem at all?

Mr. GALE. No, sir.

Senator PASTORE. Thank you.

Mr. GALE. Now I come to the specific matters referred to in Senator Anderson's letter of April 25th to members of the atomic power and insurance industries.

What is our view as to the specific indemnity proposal outlined by Senator Anderson?

A governmental excess indemnity of the type suggested would be quite acceptable in principle. The $500 million ceiling for any one disaster, coupled with special legislation to cover damages to the public in excess of such amount, should also be satisfactory.

Chairman ANDERSON. May I go back there now? What if there is not special legislation covering damage to the public in excess of that amount?

Mr. GALE. As I understand it, Senator Anderson, the proposal would limit our liability to the insurance we bought and the indemnity we have, and I think that the Congress is interested in the people and will work out the remainder of that problem satisfactorily.

Chairman ANDERSON. The thought the other day was, and previously has been, that if it should develop that $500 million or $550 million is not enough for the accident we are quite sure will never happen, then the Congress might decide what it next would do and not specifically include it in the bill.

Mr. GALE. Yes, sir.

The use of a minimum annual charge for indemnity coverage with the proceeds devoted to research and development is most desirable. I say this because I am convinced that there is little probability of ever paying out any indemnity. Thus, the funds collected would be put to constructive work in the research and development program on atomic safety.

Senator PASTORE. On that very point, Mr. Gale.

Mr. GALE. Yes, sir.

Senator PASTORE. Whatever legislation was passed with reference to the $450 million, if the private insurance companies' coverage was going to be $50 million, would you have to limit your liability to that coverage of $50 million or whatever it happens to be on the part of the insurance companies?

Mr. GALE. I believe that is true, Senator Pastore.

Senator PASTORE. Could we get a little more positive statement? You say, "I believe that is true." What if that was not the case? How much would it deter you in the progress of this research and development?

Mr. GALE. As I will say later here, we have not decided that we are definitely going to drop this project if Congress does not do anything. However, I do not mean to minimize the need for the insurance, but I am trying to state what our policy is.

Obviously, if we were covered up to, I thought it was, 500-plus million—but 50 million or less, I guess, in these figures does not make much difference—that would put us in a much stronger position than we are in now. But the problem here is the stratospheric phase of it, and the problem cannot be gotten away from. If it is there, it has to be borne by someone. In my own view of it, the limits of our responsibility ought to be defined and, therefore, that once we do A and B, from then on the problem is that of the people as a whole.

Chairman ANDERSON. Would it not be possible, Mr. Gale, if you had to operate a nuclear reactor and you had what I regard as a prudent interest in the welfare of the stockholders in your company, knowing the corporate possibilities as you must, you could very easily organize an operating company for the reactor that might tend to cut down the liability of your company? It is much better to approach it that way because the public should not be left without protection.

Mr. GALE. That is right.

Chairman ANDERSON. Where, if you got $500 million on top of or inclusive of the 50 million, you would give the public some real protection for the operation of this reactor?

Mr. GALE. Yes, sir.

Senator PASTORE. That was the problem concerning me. I am just trying to nail this down as specifically as we can just to know what our limitations should be and the broadness of the entire panorama so far as the insurance problem is concerned. I go along with the idea that $500 million seems to be an accurate figure, but the thing that is bothering me—let us assume, God forbid, we had an incident that ran the damages or liabilities up to a billion dollars.

Mr. GALE. Yes.

Senator PASTORE. Then how do we pin down the responsibility of the liability with reference to the difference between a half a billion and a billion, whether we should say something about it in the original act or should we leave that for future consideration on the part of Congress? And how does business feel about that?

Mr. GALE. The way we feel about it is that we ought to be discharged from liability.

Senator PASTORE. Completely after the $50 million?

Mr. GALE. Yes, sir. One point I would like to make about that is that we are in a very rapidly growing section of the country, as

evidenced by the fact that we have to put in a million kilowatts in the next 5 years. We have a responsibility to finance that, and so it is not entirely a matter of the private stockholders of Commonwealth Edison; it is providing electric service to a very important area of the country. Our solvency is something that is important to the people as well as to the stockholders. It is important to them, too, of course.

Chairman ANDERSON. But right along that line, you have your responsibility to your stockholders, but you also have, in a way, partners in this venture by reason of the fact that the Federal Government asks you to make application, checks your plans, checks the safety features of it, has had more reactor experience than you have had, and says to you, "We think this is a safe type of reactor to build."

Mr. GALE. Yes, sir.

Chairman ANDERSON. So this is quite a lot different from the ordinary venture along this same line.

Mr. GALE. Correct, sir.

Chairman ANDERSON. The Government is more heavily involved in this than it would be in any other venture of any nature I know anything about, and probably ought to share it from that standpoint.

Mr. GALE. Yes.

What about the need for more specifics on the probability of reactor accidents, extent of damage, and reactor safety standards and practices?

I agree that additional information is needed on the probability of reactor accidents and extent of damage. In such a completely new field, such probabilities cannot be fully determined theoretically.

The rational way to get information in this regard is to build and operate the various types of reactors now proposed. A practical way to determine what can be achieved in the way of future safety is for the AEC, as the safeguard agency, and the constructors and operators actually to work out protective features in the various reactors. There is no magic date when a final answer will be forthcoming. This knowledge will be acquired gradually over a period of years.

The lack of complete knowledge is why a governmental backstop is needed and, therefore, should not stand in the way of legislation at this time.

Chairman ANDERSON. May I stop you there, Mr. Gale?

Mr. GALE. Yes, sir.

Chairman ANDERSON. We have had the staff of the Joint Committee working on a bill simultaneously with the work being done by the Atomic Energy Commission, and in the bill which the Joint Committee was working on there was a provision with reference to this liability. I am going to read it because I think it may be well to go into the record so that when you get the record you have a chance to study it before we have hearings on the final bill. I just wanted to say that we hope maybe the Atomic Energy Commission's bill may be introduced and maybe a bill like the one our staff has worked on may be presented, and then we may have very short hearings again on the specific contents of that definite bill.

Mr. GALE. Yes.

Chairman ANDERSON. One of the provisions that was in it is this one:

The owner or operator of a production or utilization facility and all other parties set forth in subsection (d) above—

that is the man who makes it, the man who puts it all together, as well as the operator of it—

shall not be liable for damages for the malfunctioning of such facility in aggregate amount of more than the amount of the financial protection required to be obtained by the Commission, together with the sum set forth in subsection (d) above—

which is $500 million—

and any other sums which may be made available for the payment of such damages. In the event that such claims for damages exceed this aggregate sum, the contractor or licensee may apply to the appropriate district court of the United States having venue in bankruptcy matters over the location of the facility for an order limiting his liability, including all contractors and subcontractors, in accordance with the provisions of this section, and for further orders, as appropriate, apportioning the payments to be made to such claimants upon appropriate proof of damage and permitting partial payments to be made before final determination of the total claims.

In other words, if you did have, as Senator Pastore has pointed out, a billion-dollar loss and had half a billion dollars in total insurance, the bankruptcy court might apportion that total of half billion dollars among all the claimants and give them a 50-percent settlement, as they would in an ordinary bankruptcy matter, and then the matter could come back to the Congress and let the Congress see if additional appropriations would be necessary.

Most of us, I am sure all of us, agree with you that the likelihood of any one of these accidents is so extremely remote that we would not be building them if we thought there was a possibility of it.

Mr. GALE. That is right.

Chairman ANDERSON. But, nonetheless, there could be additional money made available by the Congress in the first stage or it could be made available at a later time. But it seems that something of that nature where you make a partial assignment could be effective.

You and other witnesses may take a look at that, and we will be expecting at some later date your comment on it when we come down to the actual consideration of a specific bill, which the committee hopes to have, and I very much hope it will.

Senator PASTORE. May I make an observation at this point, Mr. Chairman?

I think that the staff ought to be instructed to consider that limitation of liability with relation to the constitutionality of it. I think that the Government can limit its own liability, but whether it can limit the recovery of a citizen who is injured in a peacetime activity is a constitutional question which should be researched. I do not think we have the authority to do it in the Congress. We may be stepping upon the sovereign rights of the individual States. Not only that, we may be limiting the rights of citizens who have rights in this Constitution. So I think that ought to be explored.

Chairman ANDERSON. I do want to point out the staff has been engaged in researching that question now and will continue to do it. Mr. Gale, if your attorneys have some spare moments, anything that they discover will be of interest to us.

Mr. GALE. Yes, sir. What about rates to be charged by the private insurance industry?

We, of course, are vitally interested in insurance rates. Our entire program has been formulated on the principle that, if the $15 million of research and development cost is disregarded, our plant will produce power at a cost competitive with coal-fired units. Total insurance costs must not be so high as to destroy these economics.

The private insurance industry has indicated that because of the experimental nature of the reactor program and the fact that each installation will vary as to hazard because of design, location, power level, and so forth, it believes that insurance rates will have to be determined separately for each installation. If this is so, it will be necessary to proceed with the reactor program in advance of the fixing of insurance rates. We have full confidence that the insurance industry, when the time comes, will set their rates at a reasonable level. In any case, however, we think that the reactor program is of sufficient urgency to warrant going ahead with the necessary legislation without waiting for a final answer to this problem.

Will the atomic power program be accelerated if the insurance problem is settled promptly?

A number of utilities, both private and public, and many industrial companies are moving forward rapidly with the expectation of the passage of a law to provide public liability indemnity. However, many of them have indicated that a failure to solve the liability problem will delay and perhaps completely halt their projects.

In our opinion, the program will be accelerated if the insurance problem is settled promptly.

In this connection, it seems to us that emphasis should continue to be placed on advancing knowledge and improving designs. A number of different designs have been proposed by private industry and local public bodies. Government action on the indemnity proposal would encourage them to take prompt action. It also would encourage manufacturers to go forward with new designs on a free and competitive basis.

In some areas of the world where fuel costs are high, it may be important to build a large amount of nuclear capacity using designs which are already proven. In the United States, with our relatively low cost and abundant fuels, it is of greater importance to give industry every incentive to build a variety of types in order to learn the secret of competitive nuclear power. The present power reactor demonstration program will not only make important contributions in this direction, but it will also help us to hold the lead in the international race for peacetime uses of the atom.

Before I conclude, I want to summarize our position as best I can on the matter of insurance.

We have not reached a decision as to whether or not we would abandon our project if the insurance problem were not solved. Instead, we have devoted our thought and energy toward finding a fair and logical solution.

Rather than to say to you that we will drop our project if the necessary legislation is not enacted, I would much prefer to convince you that the logical solution is private insurance for the ordinary risk and Government indemnity for the extraordinary risk.

Assuming that a solution to the insurance problem will be forthcoming, I see no other roadblock to impede the progress of our project.

As I have said, we have a contract with General Electric Co. for the design and construction of the plant. Bechtel Corp. is the engineer-constructor subcontractor.

Beginning in January of this year, we and our associates have paid General Electric $750,000 each month toward the contract cost of our project, currently a total of $3,750,000. By the end of this year these payments will have totaled $9 million. We will continue to make monthly payments of $750,000 for 5 years until the entire $45 million is paid. Our project is not a mere conversation piece.

I mentioned that our contract calls for the completion of our project on or before December 8, 1960. The deadline set by the Atomic Energy Commission for initial fueling of the reactor is September 30, 1960.

Our present estimate is that our completed 180,000-kilowatt plant will be ready for trial operation by July 1 of that year—6 months ahead of the original schedule and 3 months ahead of the AEC deadline. Thank you.

Chairman ANDERSON. Thank you, Mr. Gale. I think it would be proper to commend you very strongly for the paragraph on page 7 reading:

> Rather than to say to you that we will drop our project if the necessary legislation is not enacted, I would much prefer to convince you that the logical solution is private insurance for the ordinary risk and Government indemnity for the extraordinary risk.

Mr. GALE. Thank you, sir.

Chairman ANDERSON. I think that is a fine statement, which we greatly appreciate. I am happy to see that you are going right along with your project, depending upon the good sense of Congress to try to find a solution to the insurance problem while you find a solution to the construction problem.

Mr. GALE. Thank you.

Senator PASTORE. My only wish is that we had 50 other projects just like yours.

Mr. GALE. Thank you.

Senator PASTORE. My only wish is that we had 50 other projects just like yours.

Mr. GALE. Thank you, sir.

Chairman ANDERSON. Thank you very much, Mr. Gale. I hope you will feel free to come back any time you have a problem that you want to present to this committee.

Mr. GALE. Thank you, sir.

Chairman ANDERSON. Mr. McCune.

Mr. MCCUNE. Good morning, Senator Anderson.

Chairman ANDERSON. Good morning, Mr. McCune. Thank you very much for being here. You have testified very many times before this committee, and we have enjoyed having you here. I think you have been very helpful to us in our consideration of other problems. I know you are very much interested in this one, and we are anxious to hear what you have to say.

Mr. MCCUNE. Thank you, sir.

Chairman ANDERSON. Proceed when you are ready.

STATEMENT OF FRANCIS H. McCUNE, VICE PRESIDENT, ATOMIC PRODUCTS DIVISION, GENERAL ELECTRIC CO.; ACCOMPANIED BY WILLIAM F. KENNEDY, COUNSEL, ATOMIC PRODUCTS DIVISION

Mr. McCUNE. I have with me Mr. Kennedy, counsel of the division, who has appeared with me before.

These are fateful hearings. Out of them will come decisions which will influence the course of our atomic development for years to come. I believe that all of us who have been asked to appear realize this and are conscious of the gravity of our responsibility.

My testimony today will consist of three parts. In the first part, I will discuss the need for legislation on atomic liability. The second will deal with the substance of the proposed legislation. The third part will be directed to Chairman Anderson's questions as to the effect of liability legislation on atomic development.

First is need for legislation. General Electric's views on the atomic liability problem have been the subject of testimony before this committee on several occasions beginning in 1954. By now they are well known to you. Today, I would like to summarize them again.

Reactor operation results in the accumulation within the reactor core of radioactive or poisonous fission products. Escape of these fission products would result in harm to people and property. The chance that there will be any escape at all is quite small. The chance that any significant quantity of fission products will escape is even smaller. The chance that a significant quantity will escape and be disseminated beyond the immediate vicinity of the reactor, is smaller still.

However, a serious nuclear incident could happen. If it happened, the resulting harm could far exceed the $65 million or so of liability coverage which the insurance industry has indicated it will make available.

Unless this coverage is supplemented, the public will not have adequate protection against the results of a nuclear incident. Moreover, the possibility of such an extraordinary liability will at minimum deter industry from taking on some projects and will slow down the pace of atomic development.

Here I would like to talk about probability and magnitude. Senator Anderson's letter of April 25 states:

> We need more specifics on the probabilities of reactor accidents, and extent of damage * * *

Meeting all the implications of this question is beyond anything that we know at this time.

First, the word "reactor" covers a tremendous variety of equipment. For an analogy let us consider the words "internal combustion engine." These range from the little units used for model airplanes fueled with a medicine dropper all the way through lawnmower engines, outboard motor engines, automobile engines, and so on up to tremendous units delivering thousands of horsepower. In the same way, reactors cover a tremendous range from experimental units which are never operated in such a way as to develop fission products, all the way up to tremendous installations which comprise our production facilities. In this area generalization is dangerous. But I will try to give you the picture as I see it.

There are two types of hazard in an atomic installation. The first is that of ordinary heavy machinery. Here I feel that a reactor is extra safe. The tremendous attention given to safety from the very inception of design results in an unusual degree of safety in normal operation.

The second type of hazard is the atomic hazard. Here we are concerned with the very nature of the reaction. In order to get energy from the fission reaction, it is necessary that some atoms be split. It is in the process of splitting that energy is liberated. The split atoms or fragments are quite radioactive. Many of the fragments lose this radioactivity very quickly; others retain it much longer. Hence, we have, in any reactor which has produced substantial power, a considerable quantity of atoms of varying degrees of radioactivity.

Radioactive atoms in sufficient quantity are dangerous to life. Certain radioactive atoms are extremely so. This in itself is not an impossible situation. For example, natural gas pipelines thread across the whole country. They are filled with a highly flammable material dangerous to life and to property. The electrical transmitting and distribution system of this country is a maze of wires capable, if the proper circumstances existed, of delivering a lethal blow.

Hence the fact that a reactor contains fission products, is not in itself the problem. The problem is: Can they escape from their containers and if they escape, how might they affect the surrounding countryside? It is obvious that if the material were to escape, and if at the moment of escape atmospheric conditions were at their worst, and if the material as it escaped were in such condition that these adverse weather conditions neither dispersed the material so widely that it was harmless, nor deposited it so quickly that only the immediate site was involved, and if enough material escaped, then we would have what has been termed a catastrophe.

I would like to point out here that the major hazard is to property rather than to life. A runaway reactor is not like an atomic bomb which would make its effects immediatly felt. We are not talking of an explosion, but of a much slower happening where it would be possible to warn people away from the affected area. We are talking about contamination which would make the territory involved unsuitable for continuous habitation until the natural effects of the weather and of decaying radioactivity again made the territory safe.

Obviously, therefore, this portion of the analysis depends on the assumption that these fission products would be released to the air in such form that they would not immediately drop out around the site but would, in fact, be subject to the whims of nature. This key point is a subject of conjecture. Things might not happen this way at all.

Senator PASTORE. At this point, I think the paragraph previous to that needs emphasis because, to me, it represents a comforting situation that ought to be better explained so that we would not frighten half of our population as to what these reactors are going to do. You see the problem, as I see it from your presentation, more as a damage to property than you do see it to life?

Mr. MCCUNE. Correct, sir.

Senator PASTORE. Because of the very nature of these reactors there would be a period of time within which you could warn people to remove themselves from the particular site and get away from the contamination. Is that right?

Mr. MCCUNE. Yes. I have not had an opportunity to read the Atomic Energy Commission's testimony on this point, but I understand their presentation was much along the same lines as what I have said. I think they gave a statement of the number of people who might be involved. But we are not capitalizing the cost of people in these large things. The large numbers we are talking about are essentially the property, just as you have said. We feel strongly that while, as in the case of any major industrial accident or fire or catastrophe, some people would be involved, and you cannot exclude liability for people's life and health, the major problem is one of property.

In considering reactor design, we make the assumptions that will call for the greatest safety. For design purposes, the assumption is that if the fission products were released, they would be dispersed in the most dangerous way. But this is an area in which we do not know. The meager experience we have has never resulted in massive clouds deposited by weather conditions in such a way as to produce significant damage.

Now let us return to the question: Can the fission products escape at all? Here, all our engineering knowledge and ingenuity is devoted to the proposition that they must not escape. Nevertheless, when all this is done responsible individuals have reviewed the results and said, from time to time, here there is a one in a hundred chance that we do not know what whe are doing, here again is another 100 to 1 chance, and so on, resulting in estimates that, say one in 10,000 reactor years or once in 100,000 reactor years on a probability basis something very serious might happen.

In reviewing this situation for the Dresden station, we determined that even in the case of such probabilities we should provide an enclosing vessel. The vessel will be designed to be gas tight at the pressures which might be calculated if such release took place and will be so placed around the installation that the fission products would be contained within the vessel. Here we have the question of the performancec of large structures, very few of which have ever been constructed. Once in a lifetime we have the spectacle of a major structure such as the Tacoma Bridge collapsing where the most competent engineers found that their best laid plans did not meet the demands of inexorable natural forces.

When all these considerations are put together, we find that we are in an area of judgment and of judgment alone and that the probabilities are—and here I must pause. Words have been used such as "highly unlikely," "extremely remote," and so on. To my mind, these words simply do not convey the proper impression. Let us try an analogy. Based on 1955 performance of United States international airlines, a person could have made a round trip crossing of the Atlantic in an airplane once a week for 5,000 years with an even chance of survival. I sincerely believe that the odds of reactor failure producing catastrophic damage are much less than this.

Nevertheless, anything that may happen once in a thousand or once in a million years, may happen in the first year. We cannot back up

our judgment of the unknown with experience which amounts to only about 100 reactor years in this country. We can extrapolate from an aggregation of various happenings, assuming, for example, that there might be one-tenth as many major troubles as there have been minor and one-hundredth as many catastrophic troubles as there have been minor troubles. Here again we are operating on conjecture, although surprisingly enough this approach give much the same answer as the one I have just described.

Meanwhile I think we can take encouragement from the fact that to my knowledge we have had nothing indicative of a major catastrophe potential on any reactor designed for continuous steady operation. Such incidents as have been reported were either caused deliberately as in the case of the Borax experiment in order to get data, or have applied to units made deliberately for experimentation, such as Chalk River, or to small demonstration prototypes, and so forth.

SAFETY PRACTICES AND STANDARDS

Chairman Anderson's April 25 letter states:

*** * * Also needed is more information on AEC and industry reactor safety standards and practices.**

Reactor safety begins for us even before reactor design. The following is typical. For civilian power applications we may choose in the first place reactor types which are self-regulating so that they tend to stable operation without any control devices. If possible, we choose a reactor system on which there has already been some operating experience and extensive hazard experimentation or analysis. Having thus satisfied ourselves that the reactor type is basically a safe one, we then proceed to design, in addition, safety features. For example, we include safety circuits which will shut the reactor down if the pressure, or the temperature, or the power level, or the rate of increase of power level exceed carefully chosen safe values. Each of these circuits depends on several sensing instruments, so that if one of the thermometers fails another will pick up the reading. Furthermore, these devices fail safe, that is, if no signal is received the reactor is shut down. Our control drives are as reliable as we can make them, and they are extensively tested. But we always put in enough extra controls so that even if 20 or 30 percent of them fail, they can still accomplish their purpose. Again, the control rods are spring or gravity loaded so that it takes power to keep them out of the reactor; if the circuit fails or if the power fails they are driven in.

But we are not satisfied with this. We have special safety systems, such as liquid poisons, which are designed to act if all mechanical devices fail.

Next, we consider what happens if, in spite of all our efforts, the control system is completely ineffective. Here, the intrinsic safety of the system chosen begins to pay off, because this now acts as an indestructible control rod. This analysis might tell us that before the reactor will shut itself down, a hazard could exist because of the possibility of chemical reaction between the fuel element and the coolant; this has important bearing on the choice of fuel and so on. Thus, we revise our design and our operating procedures in the light of analysis so that the self-regulating features of the system are maximized and the possible power excursions are minimized. Of course,

all components of the system are designed to accommodate considerably more severe conditions than we anticipate; and conventional safety devices such as pressure relief valves are added. All of this is accompanied by the most thorough and painstaking analysis and testing, using every resource of modern technology.

The results of all this study are incorporated in operating manuals and instruction books, and months before we plan to operate we begin training operators at other reactor installations.

Finally, after we have made provision for every eventuality we know of or even suspect, we enclose the whole reactor system in a huge envelope, designed to contain the maximum energy release which might occur under some barely conceivable circumstances.

In sum, the companies now planning to design, construct, and operate additional reactors are highly responsible. They can be expected to take every reasonable precaution. Moreover, the public has the additional assurance that at every step of the way the effort of industry to meet the requirements of safety will be checked by the staff of the Commission and by its advisory group.

TIMING OF LEGISLATION

In his April 25 letter, Chairman Anderson asked for information about the range of private insurance rates. It presently appears that these rates will depend in each case on the total situation with respect to each particular reactor. They may not be set for some time. I hope, however, that legislation will not be delayed until rates are set. I sincerely believe that action in this session of the Congress will accelerate the program but that a "wait and see" attitude on the part of Congress, which might be very reasonable in other circumstances, can only cause a wait and see attitude all down the line. Few races are won under the latter circumstances.

WHAT NEEDS TO BE DONE

Hence, I believe that the whole subject boils down to this.

First, those who design and operate reactors must be responsible people with good knowledge of the subject. They must make the matter of reactor safety a prime consideration. This is what has been done on the Government reactors which we have designed and this is what we are doing on our commercial installations.

Second, there is need for liability coverage which has a double purpose—both to protect the general public and to encourage that portion of the public which risks its savings in our corporate enterprises to have its managements take atomic risks in the public interest by having those risks spread in a way to keep them within reason for the individual investor.

Third, the committee has seen the atmosphere of uncertainty, doubt and difficulty which this liability situation produces. Unless we can establish overriding liability protection, I foresee a situation on dead center, a vacillation, a tremendously important activity hung up on surging tides of emotion.

Fourth, many of us have searched, and will continue to search, for overriding technical panaceas. I believe that only experience and knowledge derived from programs now going forward, and which will

be put in motion, will provide solutions. We know that such isolation as can be obtained in the country is not the complete answer. We know that multiplication of safety devices can be carried to a point where it itself is dangerous. Nevertheless, there is no question in my mind that the reactors which we are building for peacetime use are inherently safer than those which have been built to meet our defense needs. As we steadily improve our knowledge and increase our experience over the next 10 years or so, I believe that the need for overriding liability protection by the Government will disappear. As I have pointed out previously, however, I sincerely believe that now the need does exist.

Chairman ANDERSON. Just one second there, Mr. McCune.

Mr. MCCUNE. Yes, sir.

Chairman ANDERSON. On the third item which you have listed, you say:

> The committee has seen the atmosphere of uncertainty, doubt and difficulty which this liability situation produces. Unless we can establish overriding liability protection, I foresee a situation on dead center, a vacillation, a tremendously important activity hung up on surging tides of emotion.

The present program, though, is not on dead center. You heard Mr. Gale's testimony he is going right ahead, you heard Mr. Searing's testimony he is going right ahead.

Mr. MCCUNE. I would like to make the point here, Senator, I know of no program which has been discussed which is not going ahead. I believe sincerely they are going ahead on the assumption that we would get licenses, on the assumption we would get fuel, on the assumption that we would get liability protection. All of these things are coming true. We had to start this on the assumption that everything would work out. We did not wait until it worked out.

Chairman ANDERSON. And you want to keep making good on those assumptions?

Mr. MCCUNE. Yes, sir. If we cannot make good on those assumptions, the program in going to vacillate.

Chairman ANDERSON. I just want to be sure that the lack of this legislation up to now has not delayed the program.

Mr. MCCUNE. It has not on our part. I would not be surprised, though, that there are people who have questioned it.

Chairman ANDERSON. The two I mentioned stated they are going ahead, and you are going ahead. I am glad of it.

Mr. MCCUNE. That is correct, sir.

THE SUBSTANCE OF THE LEGISLATION

Next, I would like to take up the specific proposals outlined in Chairman Anderson's letter of April 25. These proposals are a sound basis for legislation. The provision for indemnity up to $500 million coupled with special legislation to take care of any damages above this amount will afford to the public protection against the results of a nuclear incident. By removing the fear of catastrophic liability, such legislation would encourage private participation in the development of atomic energy. The suggestion that industry payments be used for research in safety is an appealing one.

Today I want to reiterate one point which was made in my March 5 testimony. I would like to see a bill dealing with atomic liability

which would cover reactors owned by the Government as well as other reactors. The private insurance provision outlined in Senator Anderson's April 25 letter might not be appropriate for Government reactors. But in other respects, the liability problem could be treated in the same way.

Chairman ANDERSON. May I just say to you there, Mr. McCune, the draft the staff is working on does include Government-owned reactors.

Mr. MCCUNE. I am glad to hear that.

Chairman ANDERSON. I believe we may be able to work something out to fit the various groups and try to protect the public on Government-owned reactors as well.

Senator PASTORE. May I ask you a question on your opinion on this subject?

Mr. MCCUNE. Yes, sir.

Senator PASTORE. If this matter was resolved by proper legislation as we have talked about and as you have discussed it, and if we override these other matters of the Public Utility Holding Company Act, and write off research as operating expenses, do you feel then it will be necessary for the Government to expend any of its own money in building publicly owned reactors and that private industry, in and of itself, can do this job satisfactorily and in competition with other governments?

Mr. MCCUNE. I believe so, yes, sir. I was going to say next the problem exists regardless of who owns the reactor.

Senator PASTORE. The point I mean to make is this: There is so much discussion that the Government itself ought to start building reactors, which, of course, involves expenditures of tremendous amounts of money. Then there seems to be some kind of reluctance or hesitation as to how far the Government should go in indemnifying in case of losses on these catastrophes which we are talking about in the event private industry does build the reactors themselves. It strikes me it is still money no matter how you look at it, it is still responsibility no matter how you look at it; and if private industry can, with these small concessions, which I consider to be small by comparison to the vastness of the program—if we can make these concessions, then it will not be necessary to spend the taxpayers' money to make reactors that are publicly owned.

Mr. MCCUNE. I certainly sincerely believe that this program will be advanced accurately toward the ultimate objective, which is economic power, by the present situation if we can solve the liability problem. I am convinced of that.

Senator PASTORE. Because I am convinced if we can get many more projects like the one Mr. Gale is talking about, it strikes me this program would be pretty well off the ground.

Mr. MCCUNE. The public has the same need for financial protection against harm sustained in a nuclear incident. Government-owned reactors would be designed, built and operated by private companies. These private companies would have essentially the same risk of liability to members of the public that they would have if the reactor were privately owned.

It is sometimes supposed that on Government-owned reactors this problem has been solved by Government indemnity. This is true in some situations. But there are many situations where it is not true.

There are hold-harmless provisions, and I believe some of those have been put on the record, but in some cases where it is intended that an indemnity be granted, there are legal questions as to its value, and there are many situations which are not really covered by the specific contractual arrangement.

Legislation on atomic liability should deal with the problem on an equitable and comprehensive basis. With respect to Government and private reactors, it is important that we have both uniformity of treatment and clarity of intent. The bill should authorize indemnity with respect to Government facilities and should contain a requirement that such indemnities be granted so that the public will be protected.

THE EFFECT OF LEGISLATION

In his April 25 letter, Chairman Anderson asks two further searching questions. The first is: Will atomic development be accelerated by enactment of liability legislation? The second is: Are there any other roadblocks in the way of our atomic progress?

Resolution of the liability problem will remove a major obstacle in the path of projects now under way. It means, in my judgment, that more projects will be undertaken and that they will be undertaken sooner.

Are there any other roadblocks? In the 1954 act, Congress has given the Commission very broad powers. However, if the act is administered as Congress intended, I do not anticipate any other major legal or regulatory hurdles. I have every confidence that the Commission will so administer the act.

Chairman ANDERSON. Mr. McCune, the reason that second question was asked—"Are there any other roadblocks in the way of our atomic progress"—is this: that you are entitled to have your day in court and all that.

Mr. MCCUNE. I understand, sir.

Chairman ANDERSON. Even in a wedding ceremony they turn and ask if anybody has any objection, knows of any impediment to that marriage, and if there is not, if he does not speak out, then he is supposed to forever after hold his peace.

We are asking these questions so if the industry knows of anything it will speak up now or forever after hold its peace. I do not mean to say something new could not develop. I am not trying to say that. But I would not like to have somebody come in later and say, "We recognized this as a hazard and did not want to discuss it at this time."

That is the reason for this question, and I am glad you are dealing with it frankly, because we do not know of any other roadblocks.

Mr. MCCUNE. I would like to say something on that.

We have an atmosphere as far as our company is concerned like this:

I believe your committee wants this job to go forward. I believe that you have taken action which you think should make this happen. I believe that the ideas of the Congress, if I understand them correctly, are understood by the Commission. I believe that they are taking actions along the lines of the policies laid down by the Con-

gress. So long as this continues I see this liability problem as the only major roadblock.

There will be major technical problems, as I have said, such as development of truly economic fuel elements. These cannot be solved by legislative or regulatory devices. They require instead a broad and unremitting research effort. I am confident that the effort will be made and that it will produce the necessary solutions.

General Electric has been giving tangible evidence of its conviction that the problems in the atomic field—legislative, regulatory, and technical—would se solved. I will go into this in detail when I return for your further hearings. Today I simply want to say that we have been carrying forward major programs. We have embarked on the Dresden Station project for Commonwealth Edison and its associates in the nuclear power group. Important design and development is going farward in New York, the Middle West, and the Far West. A prototype test unit will be running next year. The Commission has issued construction permits for the Dresden Station and for this test unit. We are establishing the General Electric Vallecitos Atomic Laboratory in the Livermore-Pleasanton area of California. Nearby in San Jose, Calif., we are setting up manufacturing and office facilities. These activities are the measure of our faith.

Chairman ANDERSON. One of these projects in California ties directly back to the project in Chicago?

Mr. MCCUNE. Yes, sir. Without our investment in these facilities and the building of them we could not produce the Dresden Station.

Chairman ANDERSON: Where is the Dresden Station?

Mr. MCCUNE. Where will it be?

Chairman ANDERSON. The Dresden is the one 45 miles south of Chicago?

Mr. MCCUNE. Commonwealth Edison, that is right.

Chairman ANDERSON. But you are talking now about the Livermore-pleasanton area of California. That is the small 7,500-kilowatt plant, whatever it is?

Mr. MCCUNE. I am glad to answer the question, although it will be in more detail in my testimony when I return.

In order for private industry to do the kind of job required by the Dresden Station, it is necessary for us to provide the type of developmental facilities which the Government has been providing for its reactors. This we are doing, and I will show you next week photographs, with your permission, showing the ground turned, the concrete poured, the test facilities, the foundation work done for our prototype which will test the core elements later going to be put in the Dresden Station, and that is where the ground is being turned on Dresden Station.

Is that sufficient answer for now?

Chairman ANDERSON. I picked up a newspaper story the other day that it tied into the Pacific Gas & Electric Co. and never mentioned anybody else.

Mr. MCCUNE. I have not seen that newspaper story. But specifically what we are doing is this, and I will mention it again next week: We are putting, of course, fuel elements in the Dresden Station when it is built. We have designed a test reactor such that almost a complete section of that will be part of the core of the little reactor.

This reactor we expect to have running in 1957. We will get equivalant heat transfer data out of this little reactor, to check our calculations. We will get effects of radiation out of this little reactor. This is underway.

Any reactor, of course, gives out a substantial amount of heat, and the Pacific Gas & Electric Co. agreed to put a turbine there and take the heat energy and operate to produce electricity, which will mean the heat will not be wasted.

Chairman ANDERSON. Are they paying for the station?

Mr. MCCUNE. Pacific Gas & Electric plans to pay for the turbine, and we pay for the complete steam system.

Senator PASTORE. What are these facilities that you are establishing at the Livermore-Pleasanton area?

Mr. MCCUNE. One of those is this boiling water prototype reactor. Another will be a radio materials laboratory where we can determine what the effect of radiation is on these materials, and the critical assembly facility where we can check the physics. The three basic tools of the job.

Chairman ANDERSON. In connection with the other job you are talking about?

Mr. MCCUNE. That is correct.

Industry has faced complex technical problems before. Its record in dealing with these problems gives every ground for confidence. The research and engineering organizations which, in the past few decades, have made such strides in chemistry, in metallurgy, in electronics, in instrumentation and controls, in propulsion systems and in electric power generation, which have designed and built and operated the great defense facilities of the Commission, are not going to be stopped now. The gifted people, who are directing their energies to solution of the technical problems in this new field, will come up with the new ideas, the new insights that we need. We will overcome the technical difficulties, and we will attain the goal of economic nuclear power.

Chairman ANDERSON. Thank you very much, Mr. McCune, for your statement.

Mr. Chubb, this is an insurance problem, and we, therefore, are very glad to have the representative of the American Insurance Association here. We are happy to have you tell us what you can. I have looked at your statement, and it seems to me pretty brief. So we will be glad to have you interlard it anywhere you want to with additional information.

STATEMENT OF PERCY CHUBB, AMERICAN INSURANCE ASSOCIATION

Mr. CHUBB. My name is Percy Chubb. I am president of the Federal Insurance Co. and chairman of the committee on atomic energy of the American Insurance Association, an association composed of 197 stock fire and casualty insurance companies.

With the approval of the committee, I would like to limit my statement to a general one, setting forth the policy position of the stock fire and casualty insurance companies, leaving the detailed testimony on operating phases of the matter to two other witnesses who are testi-

fying before this hearing. I refer to Mr. Haugh, who testified yesterday, and Mr. Black, who will testify later.

Chairman ANDERSON. Of Liberty Mutual?

Mr. CHUBB. Home Insurance Co., sir.

Ever since the enactment of the Atomic Energy Act of 1954, the American insurance industry has felt a responsibility to provide for the evolving needs of American industry occasioned by the development of atomic power. Even prior to that date liaison was established with the Atomic Energy Commission, but it was March 1955 before final security clearances were obtained for industry representatives. Thereafter, discussions took place both with the Commission and within the industry leading to the establishment of pools for the insurance of reactors and of liabilities arising out of their operation. In consequence of these steps, the insurance industry will make available insurance covering the atomic industry in amounts substantially greater than have been available to risks subject to a single hazard in the past. In pursuing this course, insurance companies have been stimulated and encouraged by the impressions they have gained by the attitude and wishes of your committee.

It has always been the position of the American Insurance Association that the question of whether or not the Government should assume liabilities in the atomic field in excess of such available commercial insurance was one of public policy, and as such one for the Government rather than the industry to decide. It has further been the position of the American Insurance Association that if this question is decided by the Congress in the affirmative, the stock insurance industry is prepared to cooperate to the fullest extent as to questions of procedure and in the administration of the program.

The American Insurance Association believes that if the decision of the Congress as to the provision of indemnity is in the affirmative, legislation of the nature outlined in Senator Anderson's letter of April 26, 1956, would constitute a sound and constructive method of dealing with the problem. While other legislative approaches might also provide a satisfactory solution, the proposal in question appears to meet the basic needs of the situation fully.

The American Insurance Association does have one supplementary suggestion based on Senator Anderson's proposal, which the committee may wish to consider: namely, that it might be wise for some statutory standard to be established defining what constitutes a reasonable amount of public third party liability insurance over and above which Governemnt indemnity would apply.

Chairman ANDERSON. Would you like to amplify that a little bit? Do you have any figures in mind?

Mr. CHUBB. It would seem to the association, sir, that there are two alternatives, either of which could be followed. Either a definite dollar figure could be established, say, of the order of $50 million or $65 million, or else a statement of policy could be made that Government indemnity should only apply over and above such sums as the Commission determines were available commercially. I lean myself personally a little to the second suggestion because it does permit a growing private market and a gradual assumption of risk by private business rather than the Government, and does have that advantage of flexibility.

But our basic thought was it might be helpful to have either a fixed dollar amount or some such statement of policy embodied in the legislation.

Chairman ANDERSON. The only reactor that will be running before 1960 except Government-owned reactors will be the Shippingport reactor, and it is certainly partially Government owned.

Mr. CHUBB. Yes, sir.

Chairman ANDERSON. The Government will at least own all of the areas where a nuclear catastrophe might take place.

Mr. CHUBB. Yes.

Chairman ANDERSON. So we come up to the year 1960 before we really need to be worrying about coverage. I just wondered if by 1960 there is not a possibility that the carrying capacity of stock and mutual insurance companies might be substantially in excess of $50 million and, therefore, it might be wise to leave the provision open, should be only above those areas where private insurance is not available.

Mr. CHUBB. Yes, sir; I would fully agree with that: if the policy of the Congress were that the Government indemnity would apply only over such figure as from time to time might be available privately, that would give the flexibility you have in mind, sir.

Chairman ANDERSON. Then if by 1970 they had 10 years of operation and felt it was pretty safe, there might be a lot more available.

I am not sure whether you are connected with the Chubb Agency or not.

Mr. CHUBB. Yes, sir.

Chairman ANDERSON. Your family is?

Mr. CHUBB. Yes, sir.

Chairman ANDERSON. At least you know that certain types of special hazards were very hard to write for a long time. I am thinking of the cotton gin in our part of the world. You had to show how much select residential business you delivered to a company before they would take one cotton gin. You had to keep a certain proportion.

Or, to come a little closer, I can recall in 1937 when I tramped all over New York trying to place compensation risk because they would only allow you to have 10 percent of your total writings in workmen's compensation. But as the years go by those things change, and they might decide that this insurance is something very desirable and raise its limits very substantially. If you had in the law in the beginning a provision that put the Government insurance in only above the amounts that might be available, by 1970 the Government might be out of this business entirely without even repealing the law.

Mr. CHUBB. Yes, sir; I fully agree with that.

Chairman ANDERSON. You think that would be a more desirable approach?

Mr. CHUBB. Yes, sir.

Chairman ANDERSON. I read a while ago some suggestions that we made in a tentative bill which has been under consideration. I might read a little of this in another section. There is nothing final about this.

It would suggest that—

Each license for the operation, possession, or use of a production or utilization facility shall have as a condition of the license a requirement that the licensee

have financial protection of such a type and in such amounts as the Commission shall determine to be reasonably adequate to cover public liability claims against hazards involved in the malfunctioning of the facility.

That would follow in the pattern of drivers' liability laws which require a driver of automobiles to carry insurance, would it not?

Mr. CHUBB. Yes, sir.

Chairman ANDERSON. Would you tihnk that was or was not a desirable thing to put in the law?

Mr. CHUBB. I would think it was entirely reasonable, sir, for the operator of a reactor to be required to give evidence of financial responsibility up to what was a reasonable estimate of the damage that might occur; yes, sir.

Chairman ANDERSON. The next clause in that particular paragraph:

Such financial protection may include private insurance, private contractual indemnities, self-insurance, or a combination of such measures.

It will give the operator the possibility of having various strings to his bow. If it was a State university and the State had passed some special statute for any additional protection for operation of this reactor, that plus certain private insurance might be sufficient to take care of it.

Then you would think if we put in the provision that was suggested the other day—I forget who suggested it—that the lower point at which the Government insurance might attach would increase progressively as the amount available from the insurance companies might increase, and thereby provide an automatic method of getting the Government out of the insurance business—you would be sympathetic to that?

Mr. CHUBB. Yes, sir. As I understand it, you have raised two points. One is the distinction between compulsory financial responsibility and compulsory insurance. I believe the former is better. I believe a person should not be required to take insurance if they provide genuine evidence of financial responsibility up to the sum set.

Chairman ANDERSON. When it comes to $500 million nobody except some of our large corporations are going to be able to make that guaranty, and they are going to have stockholders who will not want them to make that guaranty because they are the ones that are suggesting this insurance.

Mr. CHUBB. Yes.

Chairman ANDERSON. I do not say a compulsory insurance is desirable, but I do think that the number of times a man can show he has resources sufficient to take care of a catastrophe is somewhat limited.

Mr. CHUBB. Yes, sir. I believe you suggested a combination of both might be available in some cases.

Chairman ANDERSON. Yes.

Mr. CHUBB. That would seem to me entirely fair.

Senator PASTORE. What you are actually suggesting, Mr. Chubb, is that within that area of carrying your own insurance you could be a self-insurer, but you would still expect that above that limitation up to the $500 million the Government would still indemnify?

Mr. CHUBB. Exactly; yes, sir.

Chairman ANDERSON. We had a proposal that the Commission might determine the amount of insurance or financial guarantee that the applicant for a license should have. It said:

In determining the amount of financial protection to be required, the Commission shall take into consideration the following:

(*a*) The total amount of insurance available from private sources;

(*b*) The cost of such insurance.

You recognize there might be an REA group that wanted to build a reactor and if the insurance cost was extremely high, they might be taken out of the picture, and they might be the very type of endeavor we would like to see stimulated.

(*c*) The type, size, and location of facility involved—

because there you have the exposure hazard.

(*d*) The type of ownership of the facility, whether the ownership is private, public, profitmaking, or nonprofit.

These various things might all be added into a policy or added into a determination of the amount that the Commisison might require a man carry of financial insurance of some kind. Then the Government might either pick up above that or might pick up above the amount that the Commission had determined was available in the market.

You think it would be all right to have some flexibility in there?

Mr. CHUBB. That is really a matter of public policy rather than a matter for the insurance business to speak on.

Chairman ANDERSON. But you do not try to develop public policy without having some idea what insurance companies think.

Mr. CHUBB. Speaking purely as an insurance man, I think we would like to see a provision that where commercial insurance was available the Government would not be coming in competitively with it. Where the insurance companies have exhausted their coverage—and they have gone a long way toward it at the present time—the Government would step in over that limit rather than below that.

Senator PASTORE. In other words, if the insurance companies were willing to insure up to, let's say, $200 million later on after some experience, then you would expect indemnification of the Government to be only $300 million and only apply after $200 million had been exhausted?

Mr. CHUBB. That is right.

Senator PASTORE. I mean if we are taking the figure of $500 million.

Mr. CHUBB. Yes, sir.

Senator PASTORE. In other words, as the ability of the insurance companies seems to rise, you would expect the indemnification on the part of the Government to decrease accordingly?

Mr. CHUBB. Yes. I understood, sir, from some of the previous testimony, that if there were injury to the public beyond that $500 million, it would be a problem for the Congress to deal with, in the light of circumstances then existing.

Senator PASTORE. Assuming that catastrophe.

Mr. CHUBB. I think there is a great deal of thinking that you cannot cut off at $500 million all responsibility to the public. That has to deal with very special cases you hope you are never confronted with.

Chairman ANDERSON. I am not quite sure. I would not want to just have it definite it is the feeling it is the responsibility of the Congress if it gets above that. It is only, as Senator Pastore pointed out earlier this morning, if Congress finds out they can do it constitutionally and affirmatively decides to do it.

Mr. CHUBB. Yes, sir.

Chairman ANDERSON. If a private organization is operating a reactor and there is a catastrophe, that is the responsibility of that private company until the Congress does something about it.

Mr. CHUBB. Yes, sir.

Chairman ANDERSON. Which I hope we may do.

Mr. CHUBB. I think we all hope that occasion never does arise either.

Chairman ANDERSON. You had not quite finished your statement, Mr. Chubb.

Mr. CHUBB. My concluding paragraph is merely to express the appreciation, and it is a very genuine one, sir, that all of us in the insurance business feel not only for the opportunity given us to participate in this hearing and in the recent seminar, but also for the encouragement you have given to private enterprise to grapple with these new problems.

Chairman ANDERSON. We would be happy to have any further suggestions you have to make, if you have any. When we get this bill a little farther along we will probably have a very short hearing on it, at which time we will afford your organization an opportunity to either testify or submit a statement.

Mr. CHUBB. Yes, sir.

Chairman ANDERSON. If there are ideas or principles in it we have not discussed heretofore.

Mr. CHUBB. In the absence of seeing that bill, I would not comment other than to say the basic approach set forth in your letter seemed to us a very sound and constructive approach to the problem.

Chairman ANDERSON. Thank you very much.

This concludes this morning's session. We will meet here again at 2 o'clock this afternoon.

(Whereupon, at 11:20 a. m., the joint committee recessed until 2 p. m. this same day.)

AFTERNOON SESSION

The committee reconvened at 2 p. m., upon the expiration of the recess.

Representative HOLIFIELD. The committee will be in order.

We have as our first witness this afternoon Mr. Philip Sporn, president of the American Gas & Electric Service Corp.

We will be glad to have your testimony.

STATEMENT OF PHILIP SPORN, PRESIDENT, AMERICAN GAS & ELECTRIC CO. AND NUCLEAR POWER GROUP, INC.

Mr. SPORN. Thank you, Mr. Chairman.

Again, as on the occasion of my testimony before the committee in March, I am grateful for the invitation to testify on the matter of Government indemnity to supplement private insurance covering reactor hazards to the public.

The committee is aware, I believe, that I appear in my capacity as president of Nuclear Power Group, Inc. I am also chief executive of the American Gas & Electric System. And, as your chairman brought out when I was last here, I am president of Ohio Valley Electric Corp.,

which, I am happy to report, is now delivering over 2 million kilowatts of electric power to the AEC gaseous diffusion plant at Portsmouth.

My immediate concern, in relation to indemnity and insurance, grows out of my connection with Nuclear Power Group, Inc. The work of that group, which is being carried on in association with Commonwealth Edison Co. and the General Electric Co., involves an 180,000-kilowatt boiling-water nuclear powerplant, known as the Dresden plant, which will be located about 50 miles southwest of Chicago. We anticipate that the Dresden plant can be in actual operation by the middle of 1960. But, as I testified in March, the problem of insurance represents a major hurdle which needs to be overcome before this project is in the clear so that we can confidently look forward to completing it on schedule.

I have been greatly impressed by the manner in which this committee has recognized the importance of the insurance problem and by the speed with which you are proceeding to deal with it. The conscientious and constructive job done by the committee encourages me to believe that a way will be found by the Congress to dispose of the insurance question before the close of the current session. I certainly hope this can be accomplished because I believe such action by the Congress is vital to keeping our work on the tight schedule that has been set for it.

I see no need to add to what I said in March—or to what Mr. Gale and Mr. McCune have said today—about the status of the Dresden project. It is going forward according to plan and on schedule. We are all very pleased with the Commission's action on May 4 in granting a construction permit and an allocation of fuel for the project. The insurance problem is the last remaining hurdle to be overcome.

As to that, I am very glad to say that I joint with Mr. Gale and Mr. McCune in their view that the proposal contained in your chairman's letter of April 25 for dealing with public liability represents a workable solution of the insurance problem. Considering the uncertainties and unknowns involved, all of us would have preferred indemnification limits higher than $500 million. At the same time, with the expectation of $65 million of private insurance plus the Government indemnity, the limitation of liability above that total, and the handling of additional damages by special legislation, and in view of the safety measures that will be employed in our project and the extremely remote possibility that a major accident will ever occur, I believe the proposal set forth in the chairman's letter is workable. I therefore strongly endorse the proposal as a way of meeting the insurance dilemma.

I should explain that, insofar as Nuclear Power Group, Inc., is concerned, our position is a relatively simple one. If a legislative solution of the insurance problem is reached which enables General Electric and Commonwealth Edison to get on with the job, that will settle things so far as NPG is concerned. We in the NPG group are unequivocally committed to supply $15 million as an outright contribution for research and development to the Dresden plant. We have already supplied $1,250,000 of this amount; by the end of this year we will have paid in a full $3 million. And, of course, these amounts are in addition to the $30 million which Commonwealth Edison is to invest in the project. Commonwealth has already invested $2,500,000 of this amount and, by the end of this year, will have invested $6 million.

As to the details of the proposal contained in your chairman's letter of April 25, I should like to emphasize one point. The proposal will, of course, require a determination of what is "a reasonable amount of public liability insurance provided by the private insurance industry at reasonable rates." The reasonableness of both amounts and rates may depend, to a considerable extent, on the particular circumstances of the reactor in question. From the standpoint of practical mechanics of administration, some flexibility in making the determinations of reasonableness is certainly desirable and, indeed, I think essential.

The suggestion that the Atomic Energy Commission be given discretion to determine these issues strikes me as an entirely appropriate arrangement to provide such flexibility. I think there is a particular need for enacting legislation which gives this discretionary authority to the Commission because I am afraid the insurance industry may not be able to fix rates before the close of the current session of Congress. Were we to wait, therefore, until the matter of rates had been disposed of, legislation might not be possible until next year. This would mean that, in the interim, work on all non-Federal projects would be subject to a serious uncertainty on a vital issue.

Mr. HOLIFIELD. Will you pause there, Mr. Sporn, and explain to the committee what you believe the function of the Atomic Energy Commission would be in regard to this rate fixing? Would it be for the rate which the private insurance companies should pay, or the rate which should be paid for the Government assuming the risk?

Mr. SPORN. I would think that probably they would have to enter into discussions on one and certainly would have to make perhaps a determination of the other.

But, of course, the chairman's proposal, or suggestion, in his letter of April 25, it seems to me, lays the background for the basis of procedure by the Commission and it is perhaps possible that this would be further spelled out, or should be spelled out, in the actual legislation which I am hopeful will be coming forth, perhaps under the sponsorship of the committee.

Mr. HOLIFIELD. By your testimony, you would not indicate that the Atomic Energy Commission should exercise discretion involving rates for that portion of the private industry's risk, would you?

Mr. SPORN. You mean to be supplied by the insurance companies?

Mr. HOLIFIELD. Yes.

Mr. SPORN. No, sir; I do not. I would not suggest that.

Mr. HOLIFIELD. This is the point I was directing my question to. So your testimony would apply to that portion of the risk which the Federal Government would assume?

Mr. SPORN. Yes.

The Chairman's letter of April 25 asked also for additional information on the probabilities of reactor accidents, the extent of damage, and AEC and industry reactor safety measures.

Mr. McCune is much closer to these matters—and has associated with him a group of technicians who are much more expert about them—than I am. I have found his discussion of this subject this morning, as on other occasions, extremely helpful. I hope that it will prove of value to the committee.

The final point raised in the Chairman's letter of April 25, and again in his telegram of April 30, related to what, if any, factors, other than

the insurance question, are impeding progress of the civilian reactor program.

As I indicated in response to questions of the committee when I appeared in March, the insurance question represents the only legislative problem which stands in the way of the Dresden project.

With that question settled, and with the authority already provided in the Atomic Energy Act of 1954, we see no obstacle or roadblock to our going forward at full steam and on schedule.

In making this prediction, I do not mean to underestimate the technical and technical-economic problems that have got to be solved in completing the design and construction of the reactor and in getting it into operation on a safe, reliable basis.

Any pioneering job in the technological field is bound to involve headaches.

But among the several groups which are participating in the Dresden job, we have some of the best industrial organizations in the country. In the year we have been at work, we have made excellent progress. Given a reasonable solution of the liability question, we believe we can maintain that steady, rapid progress so that Dresden will actually be supplying power by the middle of 1960.

Mr. HOLIFIELD. Thank you very much, Mr. Sporn.

Are there any questions, Mr. Price?

Representative PRICE. No questions.

Mr. HOLIFIELD. The Chair is heartened to note that you say this is the only problem from a Federal legislative standpoint that remains in this project. That indicates, does it, that you reached an agreement with the Atomic Energy Commission on the cost of fuel, the cost of reclaiming, reprocessing used slugs and so forth?

Mr. SPORN. I think we have an allocation of fuel, Mr. Chairman, but I do not believe that the details of the other matters have been worked out. I do not believe that they will present any obstacles.

Representative HOLIFIELD. It would seem to me that it would be a pretty important part of the cost of operation of your reactor. How can you plan at this time if you do not know approximately what your cost of fuel will be, the cost of your product?

Mr. SPORN. I think the cost of fuel has been set up by the Commission. The Commission has set definite rates for fuel.

As to the cost of reprocessing, so far as I know, the details of that have not been worked out, Mr. Chairman. They have not come to my attention in NPG at any rate.

Representative HOLIFIELD. You do not know whether, then, the Commission expects to charge a price which will cover the costs in that field, or whether they intend to set a price which will be in effect a subsidy price in that field?

Mr. SPORN. I don't know what the situation is on that, Mr. Chairman.

But I would think we would not stop pending working of that out, once we got this major obstacle of insurance out of the way.

As a matter of fact, we have been pushing ahead expecting the insurance problem would be worked out, this one obstacle.

Representative HOLIFIELD. Have you done any actual construction today? Have you started any construction?

Mr. SPORN. We are in the planning stage, but we have spent a great deal of money as I have indicated, Mr. Chairman.

Representative HOLIFIELD. Thank you, Mr. Sporn.

Mr. SPORN. Thank you, Mr. Chairman.

Representative HOLIFIELD. Our next witness is John Menke, president of the Nuclear Development Corporation of America.

Mr. Menke, we will be glad to hear you.

STATEMENT OF JOHN MENKE, PRESIDENT, NUCLEAR DEVELOPMENT CORPORATION OF AMERICA

Mr. MENKE. Mr. Chairman and members of the committee, my name is John Menke. I am president of NDA.

We are engaged in research and development relating to nuclear reactors, specializing in design, development, and construction of advanced reactor systems and components.

My last previous appearance before you was on March 5, during the statutory hearings dealing with the report of your Advisory Panel on the Impact of the Peaceful Uses of Atomic Energy.

This hearing is concerned with a possible need for Federal insurance program to assure compensation for damages which might result from nuclear reactor accidents.

The question before you is: Is there need for Federal insurance in order to help the civilian reactor program.

You have also requested comments on other possible roadblocks to acceleration of the civilian atomic power program. I shall attempt to speak on both points.

Those who design, build, and operate reactors expose themselves to possible damage and dangers knowingly and voluntarily. The general public, however, does not participate in the decisions as to the location of atomic plants or risks involved in the operation of such plants. It follows that the general public must be protected and must be given adequate assurance that compensation will be paid for any damages which should result from the operation of nuclear reactors. Presumably, the Congress would make special provision, for example, if the *Nautilus* suffered an extreme accident while in port, resulting in radiation danger and damage to civilian lives and property in that area. During World War II, large indemnity funds were created for compensation in the event of accident at atomic production facilities.

Such funds do insure that dollar compensation will be made for damages, but the real protection afforded the general public lies, not in insurance, but in safety of design, construction, location, and operation of hazardous plants. Such safety in turn depends upon research and development, and upon operating experience specifically related to safety and to the more general technology of nuclear reactors as well.

There is little blast hazard, none in a responsibly located plant. The real hazard consists of escape of radioactive fission products. Fortunately, with adequate external operating procedures, rapid survey and evacuation can save lives. The possible considerable inconvenience and property damage can be tolerated—better in plants somewhat outside of densely populated areas—and better if adequate advance planning (and training of local fire, police, and civil defense people) has prepared the way for quick action.

Representative HOLIFIELD. At that point, Mr. Menke, I am interested particularly in your thinking along the line of locating these

plants with the idea in mind of having them far enough away from thickly populated centers so that if an accident should occur, either from sabotage or an operating accident, or even from the standpoint of attack in case of war, that such an accident would do the least damage possible to the fewest number of people possible.

Have you given any thought to the possible limitation in terms of miles for the location outside a center of population?

Mr. MENKE. It is hard to give an arbitrary formula based on just miles. I think if you look at our previous experience we have taken our first experimental plants and put them in Arco, which is very far away indeed from most centers of population.

Ultimately in the very long run, we might get them in the center of an island like Manhattan. I don't think we are at that time today.

I think we can come in very far from the remoteness of Arco, close to the cities and still be responsibly located. I don't think we should be adjacent or in them.

Representative HOLIFIELD. At this time?

Mr. MENKE. Yes, sir.

Representative HOLIFIELD. By adjacent, would you set a reasonable number of miles, say 50 or 100 miles?

Mr. MENKE. No; I think we can do better than that. I have indicated subsequently in my paper approximately 5 or 10 miles away from densely populated areas begins to give considerable time and protection by distance without large transmission costs.

Representative HOLIFIELD. In transmission from a generating plant to an urban center of, let us say, 50 miles, is there an appreciable loss in kilowatts?

Mr. MENKE. I am not honestly experienced or competent in transmission engineering.

Representative HOLIFIELD. I know in Los Angeles we bring our electricity from the Hoover Dam which is several hundred miles.

Mr. MENKE. I think it is not a loss in power in that short distance that is very important. The cost, however, of the transmission facilities adds to the cost of the power.

Representative HOLIFIELD. That is true, but if it lessens appreciably the hazard to population, it might lessen considerably the rates of the insurance, both of the private companies, which would be a continuing expense——

Mr. MENKE. That is exactly the balance which I recommend to you in your insurance legislation.

Representative HOLIFIELD. Now, in speaking in terms of 5 or 10 miles, has there been any thought given to acknowledged hazard, which is the hazard of enemy attack in this day of supersonic planes and 10 or 15 or 20 megatone hydrogen weapons with known spheres of destruction? Have you accommodated your thinking to the possible hazard from that type of weapon in view of the fact that most of these thickly populated urban centers are on the list as possible prime targets for enemy attacks?

Mr. MENKE. Mr. Holifield, I have, I think, taken into account that possibility and do not believe that I would change my recommendation because of it.

I think I can give you an even more serious and perhaps more likely incident which would back up my recommendation of distance.

Supposing an airplane should crash into such a plant, it would be as bad as being hit by an artillery shell. It could be as bad as that. It could make a serious accident.

I think a distance of 5 or 10 miles from thickly populated centers would give quite adequate insurance of the kind that is given by the opportunity to evacuate people and prepare for the effects of the accident.

Representative HOLIFIELD. You may proceed.

Mr. MENKE. The safety of any given nuclear reactor is composed of four parts—the design of the reactor itself, the containment of possible products of accident, the location of plant, and the operating procedures, internal and external.

I would like to interject here that I think the external ones need attention soon and we have not yet fully acknowledged them.

Given adequate knowledge, it is theoretically possible to design, contain, locate, and operate any reactor so as to obviate any danger completely. This is only possible, however, without regard to economics. In the case of plants built by the Government, it has been possible to allow for inadequate knowledge of design and containment by going to remote locations. Such locations are not economic even for the Government, but the added costs have been justified on the grounds of safety. The National Reactor Test Station in Idaho, for example, is a safe location—indeed, a proper location—for experimental reactors but not a convenient or inexpensive location from the standpoint of the scientists and engineers working at the Commission's various laboratories.

Ideally, from an economic standpoint, nuclear reactors producing electricity for civilian utility systems should, of course, be located at or near the centers of maximum load. Transmission of electricity is expensive. However, atomic experience does not yet permit the location of nuclear reactors of large size in or near cities. A Federal insurance program which makes it possible to incur a higher risk than can be borne by private financial sources therefore can accelerate the achievement of economically competitive power.

Yet it would seem unwise to accelerate the program by this means if the net effect were in fact to incur great damage—even though insured. The atomic-power program would certainly not be truly accelerated by a major accident in an unwise location.

It might be of value to your committee in its deliberations on this issue to ascertain the attitude of the private insurance industry toward the remote Government reactor installations. Would it be possible to obtain private, third-party insurance on the experimental breeder reactor in Idaho, for example, and if so, what would it cost? One might also inquire about the Shippingport reactor which is located in a manner more similar to several of the privately proposed demonstration plants. Such inquiries may help you in gaging reasonable rate structures, and the balance between locations and rate.

Surely the presence of major population centers near reactor installations should influence rates and the limits of risk.

If you find that private insurance can be obtained for atomic power-plants located at relatively remote sites, then it would appear that the real problem is a combination of insurance and the economics of reactor location, as you have pointed out.

Transmission of electricity from remote locations would tend to make the presently high-cost power from early atomic plants still more expensive. Yet these higher costs seem to be less of a deterrent to remote location of demonstration plants than is the fear of setting a precedent which might forever keep reactors away from cities.

Representative HOLIFIELD. At the same time, Mr. Menke, you must realize that we are in a new field and a field where the history of risk is as yet unestablished, and recognizing the poisonous effects of escaping radioactivity in case of an accident, which we do not at this time think probable or likely, in terms of percentage, do you not thing that it might be well for us to go rather slowly in bringing the plants in close to cities until we do accumulate some more complete record of history of operation?

Mr. MENKE. I think that is in fact the purpose of the power-demonstration program, to obtain experience over the next 5 to 10 years which will permit us to bring the reactors confidently ever more closely to population centers.

I think today we can take a great step from Arco into Shippingport and Dresden, which I think are responsible moves which I could very well accept.

Representative HOLIFIELD. How close is Dresden to contiguous thickly populated areas?

Mr. MENKE. I have not studied that location.

Representative HOLIFIELD. I understand it is about 50 miles from Chicago, but I wonder if there were thickly populated communities around Dresden?

Representative PRICE. How close is it to Joliet?

Mr. MENKE. I am not involved in the Dresden plan and should not speak as if I knew. I think it is somewhat more than 10 miles.

Representative PRICE. It is 21.

Mr. MENKE. I think it is a responsible location. I think one should stay away from thickly populated areas.

As a matter of fact, with $65 million worth of private insurance, you can buy a lot of farmland, if necessary, for contamination purposes. If you contaminate farmland, $65 million would buy a very large amount.

It seems to us that your committee needs to encourage a balanced approach combining responsible location and insurance at this early stage in our experience in order to accelerate the program.

A Federal insurance system to assure compensation to the general public can be devised to encourage responsible design and plant location. Such a program must not give incentive to minimize plant investment at the cost of safety, nor can it give incentive to the location of plants in densely populated areas until such locations are clearly safe. We suspect that the formula used should relate in some way to the number of people and value of property placed in jeopardy by a particular plant location. A formula of this sort would focus attention on the relationship between insurability and location which is a fundamental problem of balance. Federal insurance which minimizes the uneconomic aspects of very remote locations could undoubtedly accelerate the power program without endangering lives or property. It should be administered to bring the plants gradually in closer—say, 5 to 10 miles—to densely populated areas in order that we may obtain 5 to 10 years of responsible powerplant experience. We are

also favorably inclined to see a Federal insurance program limited to experimental and demonstration plants, since commercial plants should eventually be totally sound private financial ventures.

Moreover, there is continuing need for research on reactor systems from the safety viewpoint. The Borax experiments and the Spert program at Idaho are effective measures in this direction.

Much of our confidence comes out of really a single series of Borax experiments.

Representative HOLIFIELD. That would be deliberate attempts to test conditions of runaway?

Mr. MENKE. Yes.

Additional efforts to understand the effect of extreme reactor system operations are being prepared and should be supported. And, of course, the demonstration programs themselves are great research efforts to gain just such long-term experience in a variety of reactor types.

In summary, insurance must be provided as part of a balanced program directed at advancing nuclear technology without encouraging the taking of excessive risks to human lives or property.

That concludes my remarks on insurance.

I would like to accept your invitation to point out other possible roadblocks. There are two difficulties which are of major consequence, both beyond our wish to resolve without making changes in fundamental national policies.

First, national defense has required the urgent development of nuclear propulsion systems for submarines, aircraft, and other military vehicles. These projects have received major attention along with the enormous efforts to develop and produce large numbers and many types of atomic and thermonuclear weapons. Research, development and production relating to these military objectives have involved the great majority—perhaps 80 to 90 percent—of all the scientists, engineers, and management personnel active in the atomic-energy industry. The emphasis for the past 10 years has not been on fundamental research of broad applicability, but has been on specific applied matters related to these vitally urgent demands.

Today the United States is truly advanced in all of these applications. But it must be noted that the technology for economic civilian atomic power is different from that demanded by military applications. To cite only one area, the problems of achieving long fuel life using natural or very slightly enriched uranium are very different from the immediate problems attacked in the process of developing military propulsion reactors. None of us wishes to urge reduced development effort on military projects, yet it is a fact that these efforts seriously affect (both helpfully and harmfully) development of civilian applications.

When the program here in the United States is sometimes contrasted unfavorably with the programs in other countries, it would be well to keep in mind the billions of atomic research and development dollars which have been spent in this country on military products superior to those in other countries. Our multikilowatt plutonium plants at Hanford and Savannah River are clearly labeled as military, too. Even the first large demonstration powerplant was of Navy aircraft carrier origin.

Secondly, our civilian atomic power program is a democratic program in which many private groups are determining for themselves the roles they wish to play. This is in marked contrast to the nationalized electric authority in England or the totally state-controlled utility system of the Soviet Union. All of us cherish the democratic way. but we should recognize that direct contrast with centralized governmental programs in other countries may disclose seeming temporary disadvantages in our way of doing things. I emphasize "temporary" because there is a growing suspicion that large-scale commitments of national resources to primitive reactor systems which can be built now may prove to be a substantial economic burden in years to come. A Soviet or British electric economy containing large numbers of high-cost, relatively primitive atomic powerplants will certainly operate at a comparative disadvantage as more efficient atomic powerplants are built in other nations. There is a nice problem of balance to be achieved in this development era. Admiral Rickover expressed it will when he urged against construction of large numbers of *Nautilus* type reactors and sought instead a steady progression of improved reactor systems for naval craft.

It is disconcerting to see other nations announcing plans for large "civilian" atomic-power programs (somewhat deviously motivated for plutonium production also). I put civilian in quotation marks because plants are somewhat motivated for plutonium production also. They are dual-purpose plants in many respects. But these announcements are not necessarily indicative of judgments more sound than our own. We have chosen to be atomically strong in the military sense; this causes some delay (and some advancement) in more rapid accomplishment of truly civilian atomic power on a large scale; but it is scarcely a roadblock I could advocate removing. We are putting democratic free choice to work rather than resorting to foreign national planning techniques, but this is scarcely a roadblock to deplore. The civilian atomic-power outlook might, indeed, be brighter; but if it were at the expense of our military strength or our freedom, it would be a small gain scarcely worth having today—even less in the future. If there is a decision now to get on faster with development of civilian atomic power, it would seem wise to do so within our own way of life, not that of others. Our way is to step up research and development, explore all the problems more aggressively, then encourage industry to take this advanced knowledge and use it effectively for the efficient systems of the future.

Thank you very much for the opportunity of appearing before you.

Representative HOLIFIELD. Are there any questions, Mr. Price?

Representative PRICE. I just merely want to make a comment relative to that paragraph.

First, we are all hopeful for the success in this participating program. We are trying to do something about this insurance matter. I think it is important for the United States to hold the leadership in the development of atomic power.

You may be a little silent on the political advantage there may be for the United States on an international basis if we are the first, say, to put in an atomic-power reactor in an underdeveloped country.

We may be at a very serious disadvantage internationally and politically if the Russians should do that before we do.

Did you take those things into consideration when you talked about our position in this matter?

Mr. MENKE. I feel, first of all, that I must agree with you very much that we must pay considerable attention to our stature in the eyes of the world on atomic energy. I think we are sometimes at a disadvantage unfairly because I think we can match them kilowatt for kilowatt if we choose to tell them what we have.

With respect to your wish to place plants in underdeveloped areas, I concur most heartily.

Representative PRICE. It might be to our advantage even to put in one of these first plants.

Mr. MENKE. I agree with you.

As a matter of fact, our firm was the only firm in the demonstration plant program to recommend putting one in a remote area.

Representative PRICE. We want the program we are interested in to be able to do that. We want it to do that. That is one of the reasons we want to remove the roadblocks so there will be no obstacles to prevent us.

Can you think of any way the British have lost their freedom because of the manner in which they are handling their program?

Mr. MENKE. Yes, I think I can. The technical decision making process as to what kind of plants the national resources of research and development would be invested in, was a very centralized decision of a very few people. It may be a right one; it may be a wrong one. It certainly is a controversial one.

And that is at a great cost to Britain, I think.

In this country the many centers of decision may very well have resulted in more various technical benefits and the country is richer therefor.

I think the technical people in Britain lost some of their decision-making freedom because they did not have the opportunity which you, your committee, and the Congress, gave to the United States industry to make technical decisions.

Representative PRICE. Yes, sir; but almost every British scientist is interested in this program; as a matter of fact, their contributions have been enormous in this field. The British scientists have been in it all the way through—are still in it. They have made enormous contributions.

Mr. MENKE. It would be as if in this country all of the decisions on technical directions were made by the Atomic Energy Commission. There is something lost if that eventuates.

Representative PRICE. I imagine there is very little we have done in this field, particularly in the matter of political decisions.

Mr. MENKE. I don't want to underestimate what the British are doing. They have done a great deal; they have made great contributions. They have made exceedingly worthwhile contributions. But the center for making decisions has not permitted the play of free minds at work and this has been a loss to them in my opinion.

Representative PRICE. Really, I want to stress the importance of our holding the leadership in this field. The insurance approach is favorable because I want to be sure there are no roadblocks in our program. I think that is important politically and economically.

As a matter of fact, it is more important to us internationally than it is domestically.

Mr. MENKE. Yes, I am sure you are right there. I think we must develop among our reactors a reactor suitable for export to undeveloped nations and I have devoted a substantial part of my firm to that effort.

Representative PRICE. That takes it to the point where we might disregard the necessity of having a perfect reactor to begin with if we are the first in some of these countries.

Mr. MENKE. Yes.

Representative HOLIFIELD. Mr. Menke, I think your statement is a thoughtful statement and I find myself in accord with quite a few of the observations that you have made in it.

I might direct attention to the last paragraph there where you say:

> If there is a decision now to get on faster with development of civilian atomic power, it would seem wise to do so within our own way of life, not that of others.

Now, sometimes we are prone to use certain phrases without really explaining exactly what they mean. I might inquire of you a little bit on the meaning of "our own way of life."

You would not say that the way we have operated in the atomic energy field up to date has not been in accord with our own way of life, would you?

Mr. MENKE. No, I would not.

Representative HOLIFIELD. It has been done under the control of representatives of the people?

Mr. MENKE. Yes.

Representative HOLIFIELD. The Government?

Mr. MENKE. Yes.

Representative HOLIFIELD. It has been done with the advise of a Commission of men chosen from various strata of American life, with rich background of experience and qualifications which seemed to the President and the Senate of the United States at least worthy to give them a chance to operate in the field.

The program itself has been controlled by the action of public representatives, both in the setting up of legislative policy and the implementation with appropriations.

So I would say that we have proceeded in accord with our way of life; in fact, we have shown that our way of life has a degree of resiliency and a degree of adaptability to a very unique and unusual situation which has enabled us to make outstanding progress in the world because we have been willing and able to adapt ourselves to these new conditions and not to be bound originally by precedent or by certain ideas that might preclude such flexible arrangements.

Now, there was a great claim of course, when we changed the law in 1954 that all you would have to do would be to change it and immediately Utopia would be here.

As times goes on, and time has gone on, we find roadblocks, difficulties, occurring which I certainly think will be solved and I think they can be solved within our way of life without violence to our way of life, but possibly not exactly along the lines that some people might think would be desirable.

It will have to be a matter of compromise as to how these roadblocks are removed.

Now, you would not say that if the Government continued to participate in this program and took over some of the liability in this field

of insurance that that would necessarily be something which is beyond our way of life, would you?

Mr. MENKE. No; I would not.

Representative HOLIFIELD. You would not say, also, that it is true free enterprise, would you?

Mr. MENKE. It is not true free enterprise.

Representative HOLIFIELD. Therefore, you would be willing to go ahead in this field because it is an unknown and new field, on a partnership basis between the Federal Government and between private enterprise?

Mr. MENKE. I think there is always an element of partnership.

Representative HOLIFIELD. And then it becomes a matter of negotiation and compromise as to what the degree shall be?

Mr. MENKE. Yes.

Representative HOLIFIELD. Now, if we continue to find roadblocks in this development which Mr. Price and you both have admitted is so important that we proceed along the line of development from an international standpoint——

Mr. MENKE. I would think that is our most important motivation.

Representative HOLIFIELD. You would not want to stand in the way of that progress because the Government would put up a greater percentage of the money to get the research job done under private enterprise, would you?

Mr. MENKE. No, I would not: I think there that this is a situation in which there is a conflict. There are tremendous reasons why we must have a very great stature internationally in atomic energy. It does not matter whether it is reasonable or not. The whole world expects us to.

Representative HOLIFIELD. We face reality.

Mr. MENKE. Yes, sir. Therefore, I think we must move fast even though the economic motivations may not always be perfect. If it was solely economic motivations, I should think you ought to give us more time because there are huge technical problems yet to be solved. We will not build a perfect plant the first time.

Representative HOLIFIELD. I think that is a reasonable balanced position. I notice in your point 13 in your summary you said:

> Insurance must be provided as a part of a balanced program directed at advancing nuclear technology without encouraging the taking of excess risks to human lives or property.

I certainly think that that is a sound statement to make and I think this is one of the goals of this committee, to see that this program goes forward without encouraging the risk of taking a great many lives and property.

That was why I directed my question toward the time until we achieved a history of operation of these different types of reactors, that we might speed the obtaining of this partnership which we seek by deliberately placing these plants a reasonable distance from these urban populations, removed far enough to eliminate a great deal of that fear that a complete city might be affected by either an operational misfortune or by shortage in time of international stress or even by enemy attack in time of war.

It might be well, I think—and that thought will be pretty well considered by the Commission, I do not know if it is even a matter of legislation—it might be that that could be handled administratively by

the criteria for the granting of licenses for the operation of these reactors, that a certain distance be required for location.

Mr. MENKE. I think it is semiautomatic. If the insurance limits that are requested for each plant take into account the potential hazard, if you put plants where there is very valuable property, densely populated, you will find that the insurance limits required are extraordinarily high.

If you put them in the centers of farmland I feel in some of our present plants you might find that the private insurance available is almost adequate.

Representative HOLIFIELD. That is one of the things I was thinking about. Because if you do get out a distance from any city, 40 or 50 miles, if that happens to be the area which is considered safe, or 20 or 30, whatever the amount would be considered safe, you would certainly buy property a lot cheaper than you would in an urban area, and not only would your capital investment in land go down, but your amount of land that you could acquire to surround your reactor would add a degree of safety and the distance from the mass of population would be another safety, and, therefore, the risk would be reduced and the cost to either the individual who put the plant up for insurance from private insurance, or the Government assumption of risk would be less.

Mr. MENKE. That is true.

Representative HOLIFIELD. Thank you very much for your testimony.

Our next witness is Mr. William S. Peterson, American Power Association.

Mr. Peterson.

STATEMENT OF WILLIAM S. PETERSON, AMERICAN PUBLIC POWER ASSOCIATION, WASHINGTON, D. C.

Mr. PETERSON. Mr. Chairman and members of the Joint Committee on Atomic Energy, my name is William S. Peterson. I am the general manager and chief engineer of the Department of Water and Power of the City of Los Angeles, and am an electrical engineer by training and profession.

As president of the American Public Power Association, I am testifying in behalf of that association today.

I have with me and would like to introduce to you Mr. Alex Radin, on my right, who is the manager of our association, and on my left Mr. James Grahl, who is our atomic-energy adviser through whom we disperse information to our members on this subject.

The American Public Power Association is a national trade organization with headquarters at 1757 K Street NW., Washington, D. C. Our association represents over 800 local publicly owned electric utilities in 40 States, Puerto Rico, and Alaska. Membership of the association consists primarily of municipally owned electric utilities but also includes public utility districts, State-owned systems, and a small number of rural electric cooperatives. No Federal power system such as the Tennessee Valley Authority or Bonneville Power Administration is a member of the association.

I am testifying today on the problem of insurance for non-Federal atomic powerplants and other roadblocks to progress in atomic power development in response to Senator Anderson's letter of April 26 to the association. The interest of our membership in atomic power development was outlined in my testimony of February 16, 1956, before this committee. In brief, it stems from our belief that the fission reaction represents an important new source of energy that should be rapidly developed, and from the intentions of our member utility systems to utilize atomic power to help meet their steadily growing requirements for electric energy as soon as economically attractive power reactors are developed.

Furthermore, of the proposals made by members of the association to the Atomic Energy Commission for the construction and operation, with AEC assistance, of demonstration atomic powerplants, all are contingent upon the availability of adequate insurance protection at reasonable costs. I refer to the proposals made by the Consumers Public Power District of Nebraska, and by the municipal utility systems of Holyoke, Mass., and Piqua, Ohio.

In his testimony before this committee, Mr. R. L. Schacht of Consumers Public Power District pointed out with respect to insurance that—

> The matter of protection against accidents and failures in the nuclear portion of the plant looms as the largest single obstacle to be overcome before Consumers District can undertake the actual construction and operation of a nuclear power plant.

Insurance also constitutes a problem for Holyoke and Piqua, although they also have other problems related to their proposals to construct atomic powerplants, and their discussions with the AEC have not progressed far enough to be able to say that insurance is at the moment "the largest single obstacle" to progress on their proposed projects.

THE PROBLEM OF INSURANCE

The information publicly available indicates that the private insurance industry is not presently in a position to supply sufficient coverage to permit non-Federal atomic power projects to proceed. This is a natural consequence of the rather sudden demand for coverage where the individual accident has potentiality for damage of many times the present risks and therefore requires a tremendous increase in reserves. For this reason, I stated in my testimony before this committee on February 16, 1956, that—

> We hold no brief for Federal insurance per se, but it appears to be the only method of avoiding protracted delays in constructing some non-Federal atomic powerplants.

In his letter of April 26, Senator Anderson invited comments on a legislative proposal for a governmental insurance or indemnity program which would include the following:

> 1. A governmental indemnity over and above a reasonable amount of public (third party) liability insurance provided by the private insurance industry at reasonable rates. A ceiling of $500 million would be placed on the governmental indemnity for any one disaster, with any damages over this sum to be handled by special legislation.
>
> 2. The liability of reactor operators and equipment manufactures would be limited to their private insurance coverage, together with the sums made avail-

able by the Government for the third party claims under the indemnity arrangement.

3. The Government would make a minimum charge per year per reactor for its indemnity coverage with the proceeds to be devoted to the AEC's research and development program on atomic safety.

As the letter indicated, this proposal incorporates features of the bills introduced by Congressman Cole (H. R. 9802) and Congressman Price (H. R. 9701). We offer the following comments on this proposal:

First, we are not sure what purpose would be served by setting an upper limit on the Government indemnity if there is to be a policy of full reparation to the public for its damages as is implied by the further provision that damages in excess of the limit would be handled by special legislation. Rather, the AEC might better use its licensing power to restrict the location or control the design of reactors and housings so as to limit the potential damage to some maximum if such is technically possible.

Representative HOLIFIELD. If the gentleman will pause there, I will say this is the line of thinking that prompted me to address my questions to Mr. Menke in regard to distance of location from urban centers.

It seems to me that the criteria of the location of these plants might solve a great deal of this problem, or, at least, minimize the cost of the insurance program without too much penalty on the matter of loss of kilowatts in transmission.

Mr. PETERSON. That is the point I am driving at.

Representative HOLIFIELD. I am assuming in this question that a distance of 40 or 50 miles would not cause a great loss of transmission from a generating plant to a load center; would it?

Mr. PETERSON. It is not insurmountable at all. We normally have transmitted that far in many instances, of course.

Representative HOLIFIELD. And much further, as a matter of fact?

Mr. PETERSON. Yes.

Representative HOLIFIELD. You may proceed.

Mr. PETERSON. Second, we have no way of judging the adequacy of the suggested ceiling of $500 million on the governmental indemnity.

A recent report prepared for the Atomic Industrial Forum states that estimates of the dollar value of the damage which might be caused by a large reactor accident—

vary from 1 to 2 hundred million dollars up to many times that amount.

In this connection the reports notes that—

In terms of contamination, a 60,000-kilowatt reactor creates in 1 year sufficient radioactivity to contaminate to the limits of tolerance, to a height of more than one-half mile, an area about 625 miles on a side.

Although not offered as the dimensions of a possible accident, this statistic does indicate very roughly the magnitude of the risk, remote though it may be, which is involved.

I would like to volunteer the remark that aside from opinions of this kind I have no personal opinion on that. But it would be my thought that that is rather the extreme.

My own personal idea of distances of safety would be like those you mentioned, probably 50 miles out to give quite a measure of protection.

Representative HOLIFIELD. Or unless there was some geographical barrier your transmission line might even be shorter.

Let us take, for instance, the city of Los Angeles there, with the range of mountains behind it. Placing a reactor behind a range of mountains or in some secluded area surrounded by natural barriers such as mountains, you might very well decrease the risk.

The Santa Susana location, for instance, is a location for North America's new experimental reactor, which you are familiar with.

I do not believe that is over 50 miles from the city of Los Angeles, yet it is in a rather secluded place so that if there was almost any type of accident there outside of a complete explosion such as you get in a bomb, which I think would hardly be possible in a reactor, you would be far enough away from the population that your risk to human life would be comparatively small.

Mr. PETERSON. I agree with you on that. I have seen the reactor location you speak of and I believe that is true.

It is our understanding that no comprehensive studies have been undertaken of the probable consequences of a major power reactor accident.

Rather than wait for years for the slow accumulation of statistical experience to indicate the risk to a community represented by an atomic powerplant, we suggest that AEC undertake promptly, or assure that others undertake, comprehensive studies and analyses to forecast, to the extent possible, the probabilities of reactor accidents under certain assumed conditions, and the probable consequences of such accidents.

Such forecasts might be no better than informed guesses, but they should provide some indication of the magnitude of the risk and the amount of insurance which it is reasonable to carry.

My third comment on item 1 relates to the references to "a reasonable amount" of private insurance at "reasonable rates."

We assume that this language does not imply that a uniform amount of private insurance would be required for each atomic powerplant. Because of the wide variation in plant location factors which will be encountered and the differing characteristics of various types of power reactors, it would seem to us impractical to specify in the legislation a minimum fixed amount or percentage of insurance to be procured from private sources.

It would seem necessary to leave the determination of what are "reasonable" amounts and rates to the discretionary determination of an executive agency, presumably AEC.

However, the assignment of this responsibility to the administering agency will represent a considerable extension of Government authority in the area of deciding how much private insurance private parties must carry and what rates it is reasonable for the insurance industry to charge. We would assume that any legislation along the lines suggested would have to include carefully developed criteria as to the meaning of "reasonable amounts" of insurance and "reasonable rates."

Representative HOLIFIELD. If you will pause at that point, you certainly indicate here that you feel that the AEC should prescribe the rates which the industry should charge.

I had been of the opinion that that area would be left up to them. I thought that the AEC would exercise that discretion of theirs above a certain amount, rather than that they would prescribe how much industry would write and what their rates would be.

It was my thought that industry would indicate that they would be willing to go up to a certain point and then the Government would step in and take over from that point on and set the rates from that point on.

It was not my feeling that the AEC would exercise any power over prescribed rates for private interests.

Mr. PETERSON. It might be that that type of function would come in a little different fashion from a rate-fixing body. What I mean, really, here is this: That if the AEC should carry on such experiments or study as I have indicated to derive some idea of the intensity of such failures of equipment and the values that are involved and the frequency with which that might happen, they would be in conference with the insurance companies using AEC technical data to assist the insurance companies in coming up with proper rates in harmony with that technical data and possibly using a little judgment with them on that.

Representative HOLIFIELD. I thought we could clarify that point. I agree with you also on the fact that any determination they might make would be on the basis of, let us say, an informed guess, to use your language, and also any determination as to reasonable amounts or reasonable rates must, of necessity, be on that same basis, because we lack the history which we ordinarily consider necessary to determine rates and amounts in the insurance field.

Mr. PETERSON. That is correct. I agree with that.

My fourth comment has to do with the types of coverage which may present problems to these first non-Federal atomic powerplants. As far as Government insurance or indemnity is concerned, attention has been focused largely on the problem of public liability insurance since this seems to be of the greatest and least predictable magnitude.

However, as Mr. Schacht has testified, Consumers Public Power District has had no indication from the insurance industry that machinery breakdown insurance at reasonable cost will be available to cover the new and novel portions of its proposed atomic powerplant, despite systematic efforts by Consumers to obtain such assurances.

We understand that a stock company pool is being formed to provide up to $50 million of insurance per plant to cover physical damage but, in view of Consumers' experience, we would urge the committee to assure itself that this problem is, in fact, on the way to solution prior to acting on the proposed Federal indemnity legislation.

Representative HOLIFIELD. Mr. Chairman, if I may ask a question there of the witness, isn't it true that until we do have definite assurance of this type, and also a specified rate that will be charged for the insurance up to the amount which they feel they can carry on a free-enterprise basis, it would be rather impossible for this committee to move in the dark into that area beyond, because we would not know how wide that area is?

Mr. PETERSON. That is correct. I think that this area is one in which they could make rates and determinations rather promptly because the costs of at least putting in the plant are known, whether you know what the cost of operation or final results are at all.

You do know what the plant costs and what it would cost to replace it. The only thing that would be lacking, and that is an important factor, is how often will that kind of an event happen, which the insurance people have to know.

Representative HOLIFIELD. I notice as you go into the rest of this on the next page there, having read a little ahead of you, you get into the field of breakdown insurance; and this is a new thought to me.

I hadn't foreseen that there was any area of insurance which the Government would have to assume above that of personal liability and possibly property damage.

Mr. PETERSON. Breakdown insurance is a point currently under discussion, and that is the type wherein they would know the magnitude of their risks, and the risks would be much smaller than the public liability, but they would not know the frequency.

Representative HOLIFIELD. You wouldn't anticipate that the Government would be in that field, either?

Mr. PETERSON. No; excepting that if these people can't get this kind of insurance and need it, then the program is held up. This is a lower range of insurance. It would seem more probable they could get it privately, but if they don't get, then what?

Representative HOLIFIELD. In other words, you are thinking of an occurrence such as the Chalk River occurrence, where there was a breakdown of the plant's operation which had some radioactive danger, but from the standpoint of operation of the plant, it stopped the operation of the plant for several days.

Mr. PETERSON. I am thinking of the company that is working on the theory of buying insurance rather than self-insurance if it can't afford those risks itself. They might want this kind of insurance before they went further, as well as needing, of course, the public-liability type of insurance.

Representative HOLIFIELD. Of course, as you point out—I don't want to anticipate your testimony, but I thought rather than interrupt you later, I would mention it now—such a melt-down of fuel elements would certainly be a catastrophe as far as the operations. It might even result in the plant becoming so radioactive that it would have to be deserted and permanently sealed.

Mr. PETERSON. That is correct.

As you know, physical damage hazards in a nuclear powerplant include not only damage to the machinery, but damage to the reactor fuel. Just as you mentioned, a core melt-down could require reprocessing and refabricating the entire core, involving very substantial costs.

I would like to point out also that the March 19, 1956, progress report of the AEC Insurance Study Group says, in discussing physical damage insurance, that—

> it appears probable that insurance against loss of use will be limited for such installations at least during the experimental period in the development of atomic power.

The lack of loss-of-use insurance might represent a problem to a prospective atomic powerplant operator, although presumably the loss of use of an experimental plant should be less serious than in the case of a conventional plant from which greater dependability would be anticipated.

I am really rather discounting the loss-of-use type of insurance on a research plant. I do not regard that as too important a consideration.

We suggest, therefore, that consideration be given to the problems of machinery breakdown and loss-of-use insurance coverage in the

course of developing the proposed Federal insurance legislation. That is looking a little to the future, rather than to the present.

As far as our members are concerned, a satisfactory solution to the machinery breakdown insurance problem may prove as necessary to proceeding with construction as is adequate public liability coverage at reasonable cost.

In respect of item 2 of Senator Anderson's letter, we would be concerned about a policy of limiting the liability of reactor operators and equipment manufacturers that would shift to the public some part of the burden in the unlikely event of a reactor catastrophe.

The phrasing of item 1 indicates that this is not intended and we would suggest that any legislation make it clear that a policy of full reparation to the public for damages caused by a reactor accident is to be followed as far as the Government indemnity arrangement is concerned.

Item 3 of Senator Anderson's legislative proposal suggests that the Government make a minimum charge per year per reactor for its indemnity coverage, the proceeds to be devoted to AEC research and development on reactor safety. The principle of making a charge for the Government indemnity provided seems to us proper and the unusual economic burdens already attendant on these first demonstration plants, plus the unknown but presumably remote probability of a major accident suggests that such a charge should be minimum.

The recovery of the true but presently unknown cost of the protection afforded during the early years of a development period would be a cost presumably passed back to the Government, together with other costs so a nominal value to establish a reasonable contract relation is sufficient.

However, it would seem desirable to allow for adjustment of the Government charge in the future, as operating experience is gained and as the economics of atomic power improve to the point that the utilities and manufacturers are able to pay more nearly what the Government indemnity is worth.

Otherwise, stabilization of the Government charge at an unduly low level would represent subsidization of atomic power costs for the long time. Such subsidization appears to be required during the developmental stage of the technology and may be required for the entire useful life of these first demonstration plants.

For obvious reasons, however, such assistance should not be continued indefinitely, after atomic power has reached the stage of economic practicality in significant areas of the United States.

In line with my previous remark about control of location and design to limit risks, we would advocate a strong AEC program of research and development aimed at improving the safety of power reactors and associated facilities. This is another type of assistance to industry which it seems essential for the Government to provide if we are to see a reasonable rate of progress in developing atomic powerplants which are both safe and economic.

Whether this research work should be financed in part from the income from Government indemnity fees is a matter of budgetary principle on which we would have no particular comment.

In the brief time available, I also have reviewed rather hastily the bill proposed 2 days ago by the Atomic Energy Commission. Several sections of this bill appear to me to raise serious questions. Subsec-

tion (a) (3) would require a reactor operator either to buy the total amount of private insurance available on the open market or else accept a gap in his public liability coverage amounting to the difference between the private insurance that he did buy and the total amount available.

This would not result in complete protection for the public in some instances and we would not favor this type of arrangement. It is not well adapted to meet the situation brought about by various-sized reactors with varying potentialities for damage.

For the same reason, we would have strong objections to subsection (a) (6), which would nullify the Government indemnity in accidents caused by bad faith, willful misconduct or gross negligence. The Government indemnity should protect the public against the hazard of accidents arising from these causes, rather than specifically exclude them from coverage.

It would make no difference whether the disaster was due to willful misconduct or some unforeseen technical cause, the public would rightfully expect to be compensated therefor.

I would also question the language of the bill as regards charges to be made. The level of charges apparently would be set high enough to build up an indemnity fund. It seems to me that this would put AEC into the insurance business and unnecessarily complicate the arrangements.

Equally objectionable, it would imply that industry was paying the full cost of the indemnity program. If Government assistance is required, it seems to us necessary as a matter of public policy to provide it in a forthright fashion and not in a way that suggests that it is a business proposition involving no Government costs.

Representative HOLIFIELD. Mr. Chairman, could I question the witness on that point?

Chairman ANDERSON. Yes.

Representative HOLIFIELD. As I understand it, the import of your testimony is that the Government should not attempt to charge in that area for which it assumes the risk rates which would put it on the actuarial basis of accumulating an indemnity fund to pay off risks, but that either (*a*) it should provide that risk as a matter of Government liability without payment; or (*b*) if it does charge a reasonable payment that payment should go into the general fund from which any liabilities would be paid in the near future anyway?

Mr. PETERSON. That is correct.

Representative HOLIFIELD. Which would you advocate? Do you advocate the Government assuming without any charge the top area of risk and paying from the general fund such indemnities as might occur, or do you advise a reasonable amount within that area for the manufacturer to pay and its conversion into the general fund, rather than to try to set the rate up on an actuarial basis?

Mr. PETERSON. It will be clearer as I go into what I call the alternative approach to the insurance problem, but to answer your question first, I think during the development period the Government should assume the entire liability and do it out of the general fund with nominal charges and not try to, let's say, kid itself or the public that it has a well-established rate.

It hasn't a good basis for a well-established rate at this time. However, I present in the next few paragraphs a method of getting the

Government ultimately out of the insurance business and that more nearly represents my ideas. These others were comments on the bill. The next is a suggestion.

Representative HOLIFIELD. All right.

Mr. PETERSON. Having commented on the insurance proposals which have been made, I should like to suggest an alternative approach which differs in some respects form these proposals.

As we understand it, public-liability insurance for atomic powerplants is a problem because the probability of a major accident is unknown and the possible extent of the resulting damages is also unknown, but is generally considered to be a very large amount for an individual occurrence.

For these reasons, the private insurance industry is at present not in position to supply sufficient coverage to permit non-Federal atomic power projects to proceed. As the result of efforts to meet this problem over the past year, we understand that insurance pools are now being formed to provide as much as $65 million per plant in public liability coverage, but the rates for this insurance are yet to be established.

The main problem here, it seems to us, is to work out arrangements that will permit the proposed non-Federal demonstration atomic powerplants to proceed with adequate insurance coverage and at the same time lay the basis for the private insurance industry to gradually provide the insurance required until eventually all coverage is provided by the insurance industry, particularly by the time atomic power generating plants become economically feasible.

We think it important that any arrangements made now look toward the day when atomic powerplant operators and equipment manufacturers pay the full and fair cost of their total insurance coverage. If the intrinsic hazards of atomic powerplants prove to be so large, even if the possibility of a major casualty proves remote, that a utility cannot afford to pay the full cost of the insurance required, then it seems doubtful that atomic power will ever become truly economic. Let me quickly add, however, that I do not expect this to be the case.

Since I am not an insurance expert, I will not attempt to discuss in detail the nature of the arrangements which we suggest. Without getting into detail, I would like to explain the principles which we believe should be reflected in any legislation proposed for a Federal indemnity or insurance program for atomic powerplants.

1. During an initial period, say 10 years, as suggested in the AEC bill, the Government should assume the entire public liability risk on the nuclear portion of the plant, with only a nominal charge to cover administrative expenses.

This should be frankly recognized as a subsidy or aid to the non-Federal demonstration plants which is required because of the unknown and possibly very large financial risks involved and the necessity of providing for full reparation to the public for its damages.

Since this is an almost completely unknown field for the private insurance companies, it would seem simpler and more straightforward to allow them about 10 years to study the problems involved and make use of the additional information and operating experience which will accumulate during that time, than to try now to set up some combination of private insurance and Government indemnity as suggested in Senator Anderson's letter.

The combination suggested by his letter, as well as by the Price bill, could lead to rather complicated administrative procedures. It would put AEC into the business of deciding how much private insurance each reactor operator and manufacturer must carry and what constitutes reasonable rates at a time when there apparently is almost no basis for making such judgments.

We see little point in charging more than a minimum fee for the Government indemnity. These demonstration plants are uneconomic investments and the addition of a significant Federal insurance cost probably would result in most cases in its being paid by the Government anyway, through increased financial assistance to these projects.

2. Having accepted the public liability burden, the Government should assure itself to the extent reasonably possible that no atomic powerplant is licensed unless it is designed and located so as to limit the public liability risk to no more than some preestablished limit. I am not able to suggest what a sensible limit would be, but I do think that the concept of limited risk should be explicitly established.

Representative HOLIFIELD. Mr. Chairman?

Chairman ANDERSON. Mr. Holifield?

Representative HOLIFIELD. Before the chairman arrived, we had some discussion on this very point with the other witnesses and with Mr. Peterson, and the burden of that exchange of questions and answers was that it seems that in this unknown field, if there is a hazard or is a suspected hazard which is so great that private industry is not ready to take it over, the emphasis should be placed on the criteria for location of these plants, being sure that they are far enough removed from an urban population to allow them to locate on cheap land and with such land around them to insure that there would be some protection against escaping fissionable material and would be far enough away where either through sabotage or a strike by enemy attack in time of war that the great urban population would not be exposed to immediate, close hazard.

I am glad to see this line of thinking develop, because at best, I think the setting of rates is going to be a guess in view of the fact that we have no historical record of the hazards involved, and it seems to me the witness is proceeding along a very sound line in his thinking on this point.

I just wanted to say that because you were absent when the exchange on this point was made, and I didn't know that you had it in your statement.

Mr. PETERSON. Thank you, Congressman.

At the end of the period of full governmental responsibility, say 10 years, when the insurance, utility, and manufacuring industries have gained some understanding of the risks involved and the rates required, the Government would gradually begin to reduce its coverage of each nuclear facility and the private insurance industry would begin to provide coverage.

The insurance industry would need to charge rates which assumed the existence of the reserves necessary to pay claims, even though such reserves would not exist in the beginning, and which would gradually build up reserves over a period of time estimated to be appropriate.

As private insurance reserves were built up and additional experience accumulated, the industry could assume an increasingly large pro-

portion of the public liability risk and the Government proportionately less, until finally the Government would withdraw altogether.

4. If a major accident occurred before the private insurance reserves had been built up sufficiently to cover it, the legislation should provide for Government coverage through loans to the insurance industry sufficient to pay for the damages and maintain the financial soundness of the insurance companies, with such loans to be repaid with interest over a period of time.

5. Federal insurance or indemnity protection should be extended only on the condition that the technical information resulting from the project or other undertaking covered by such insurance becomes publicly available. The primary purpose of extending the proposed Federal insurance protection is to accelerate the development of economic atomic power.

The achievement of this purpose could be nullified or severely limited if the projects which went ahead under an umbrella of protection provided by the people as a whole resulted in patent monopolies or trade secrets which tended to stultify free competition and rapid technical progress. The provision of Federal insurance or indemnity protection should not result in special benefits to particular companies or segments of the society but in benefits readily available to the public generally.

It is believed that the extension of Federal aid in the form of insurance coverage should be regarded by AEC as an "arrangement, or other relationship with the Commission" under section 152 of the Atomic Energy Act of 1954.

Although this suggested arrangement also would involve the Government, presumably AEC, in determining the appropriate proportions of private and governmental insurance for each facility, probably from year to year, this problem would not arise until a good deal more is know about risks and rates than is known now.

The administrative determinations would involve a great deal less guesswork than if they had to be made beginning now, as is suggested by the proposal in Senator Anderson's letter.

That completes my presentation of the suggested plan and the next subject is Other Roadblocks.

The members of our association that have made proposals to AEC for the construction and operation of atomic power demonstration plants have found that there is another serious problem, in addition to insurance, which could turn out to be a roadblock.

We mention it at this time for the information of the committee, not as a complaint but in the interest of making a full and candid response to Senator Anderson's request that "other possible roadblocks to this program" be disclosed.

This possible additional roadblock is the policy of the Atomic Energy Commission of requiring "closed-end proposals," that is, proposals from sponsors which put a fixed ceiling on the cost of AEC participation in the proposed project.

We understand AEC's reasons for this policy; it is an effort to introduce an incentive for the utility and the equipment manufacturer to do the job as cheaply as possible, thus forcing progress toward economic atomic power. However, it does not seem to us a wholly realistic policy.

There is general agreement that the costs of atomic power are unknown and that estimates of operating costs, to quote the Deputy Director of AEC's Division of Reactor Development, "are quite speculative." This official has said that—

this is why I have not and will not make operating cost estimates of nuclear plants at this time.

Despite this great uncertainty as to the operating costs which will be experienced in these first demonstration plants, AEC is insisting that the sponsors state the maximum amount of AEC assistance which will be required for the construction of the proposed plant and the research and development payments which will be made during the first 5 years of plant operation.

This means that the sponsor must agree to pay any costs which exceed the estimates or else obtain firm performance warranties from the equipment manufacturer. It has been the experience of our members that the field is too new and the technology too untried for the manufacturers to be able to provide much more than minimum performance warranties. Indeed, if this were not so, there would be little need for a demonstration program.

Our members have great difficulty in complying with the AEC "closed-end" proposal policy simply because they do not have the financial resources to accept the risks that costs may exceed the estimates by considerable amounts. This is a particular problem in respect to operating costs.

In the case of construction costs, firm prices can be obtained but, even so, there is the possibility that the AEC Reactor Safeguards Committee may require the addition of safety features not contemplated in the construction cost estimate agreed upon with AEC. In this event, there would doubtless be considerable difficulty encountered in resolving the question of who would pay the additional costs of these added features.

In respect to operating costs, virtually no firm prices and only limited performance guaranties are available, at least in the experience of our member systems. The uncertain cost factors include the cost of fabricating the fuel elements, the fuel reprocessing costs, waste disposal costs, personnel requirements, insurance costs, maintenance costs and, most important, fuel element life.

A local publicly owned utility can go only so far in accepting economic uncertainties. When they are as extensive as those involved in the construction and operation of a nuclear powerplant, it is exceedingly difficult, if not impossible, for the utility to meet the AEC requirement for a closed-end proposal.

There is also the difficulty that as the proposal is developed through detailed negotiations with AEC, additional items of cost are disclosed which were not foreseen at the time the proposal was made. However, AEC regards the proposal as fixing the AEC cost ceiling and regards these additional items as costs to be borne by the sponsor. Thus, the sponsoring utility faces a growing burden of unanticipated cost items which could exceed the sponsor's ability to bear.

I should like to emphasize very strongly, because we are sometimes misinterpreted on this score, that neither this association nor any of its members are suggesting that AEC subsidize the cost of power from demonstration reactors to the point that the sponsoring utility

obtains power for less than it would pay for conventionally produced power.

Our members cannot afford to pay more than conventional costs for power but they do expect to pay as much, if such is necessary in the case of nuclear powerplants. AEC officials have made it clear that they do not expect more than this, despite their adherence to the policy of the closed-end proposal.

As I mentioned earlier, I have commented on the AEC policy on proposals because Senator Anderson requested information on possible roadblocks. This policy is a possible obstacle. At best, it results in extensive negotiations and possibly in some delays in getting on with the projects. I cannot say that it will prove an absolute roadblock.

Even if AEC does not adopt a more flexible policy, I am sure that our members will continue to work with AEC staff earnestly and in good faith in an effort to develop agreements on their respective projects which somehow meet the AEC requirement for a fixed-price proposal and at the same time protect the sponsors against financial losses. At this point, we cannot assure you that they will be successful.

Chairman ANDERSON. Mr. Peterson, I think that that is a point that we could pass on to the AEC and ask for their views on it. I think that is a fair point to be raised and we will send this part of your testimony to AEC and ask them for comment on it, and insert those comments at the end of your testimony.

Mr. PETERSON. Thank you very much.

One of the private utility groups sponsoring a demonstration atomic power project has on occasion requested consideration by the Congress of certain other matters which they say block progress on their proposal and one of these gives us particular concern.

I refer to the proposals to amend the Public Utility Holding Company Act to exempt combinations of utilities and industrial firms from its provisions under certain conditions. Our association has reviewed the various proposals that have been made and has presented extensive testimony on this subject to a special subcommittee of the Senate Committee on Interstate and Foreign Commerce.

That testimonl was not offered by myself, but it was by Mr. Grahl on my left.

For the sake of brevity, I will not repeat that testimony here but it explains rather fully why we are convinced that no special exemptions to the Public Utility Holding Company Act are necessary to allow the private projects to proceed unhindered.

This act already provides for granting exemptions when this is not detrimental to the public interest. Our conclusion was fully confirmed by the testimony of the Securities and Exchange Commission before the same special subcommittee. We would be very much concerned if there were any disposition on the part of the Joint Committee to recommend any form of exemption to the Holding Company Act, since such special exemptions are both unnecessary and undesirable.

I should like to close by referring to what our members regard as one of the most serious roadblocks of all in getting on with this job of developing economic atomic power. The Administration and the Congress recognize that a great deal of expensive research and develop-

ment work must be done and that a first round of uneconomic demonstration reactors must be built and operated before we can advance significantly toward economic atomic power.

There seems to be a general willingness, in recognition of these facts, to assist industry very substantially through Government-financed research and development programs, the construction and operation of experimental power reactors and possibly through insurance. However, there has been a regrettable lack of boldness in taking what seems to us the logical next step, the expeditious construction by the Government of some large demonstration reactors, in addition to and not in lieu of the plants being proposed by the utility industry.

This matter is, of course, the subject of your hearings next week, and I therefore will not expand upon it. However, I mention it here because it seems to us that some Government demonstration reactors must be part and parcel of any effective effort to move ahead with the vigorous development of economic atomic power.

Thank you very much for this opportunity to express the views of the American Public Power Association on the subject of insurance and other problems in this important area of atomic power development.

Chairman ANDERSON. Thank you very much, Mr. Peterson.

Representative HOLIFIELD. Mr. Chirman, I want to say that I want to extend a special welcome to Mr. Peterson. I see that he is the general manager and chief engineer of the great department of water and power in the city of Los Angeles, which is in my district.

Chairman ANDERSON. I was afraid that would come up.

Representative HOLIFIELD. I think California deserves a little publicity on this matter.

Chairman ANDERSON. I haven't heard a word said about it in a long time.

Thank you, Mr. Peterson.

(The comments from the AEC follow:)

In the course of his testimony presented on May 17, 1956, before the Joint Committee on Atomic Energy, Mr. William S. Peterson, president of the APPA expressed the opinion that the Commission's requirement for fixed ceilings on the cost of AEC participation in power demonstration reactor proposals might turn out to represent a roadblock to those members of the association who have submitted proposals. Mr. Ramey has asked us to comment on this portion of Mr. Peterson's testimony.

Mr. Peterson is correct in his interpretation of the prime motive for the Commission's adoption of this policy. Namely, that we look upon it as a significant means of providing incentives to the equipment manufacturers and the operating utilities to reduce costs thus hastening the advent of economic nuclear power. We are aware of and sympathetic to Mr. Peterson's explanation that the association's member utilities do not have the financial resources to accept risks that may result in their costs exceeding present estimates by considerable amounts. This situation applies as well to those rural electric cooperatives who have submitted proposals. In recognition of these facts the Commission has offered assistance which would minimize though not completely eliminate the risks associated with potentially higher costs of production of electricity from nuclear plants.

With respect to capital costs, the AEC has announced its willingness to consider paying for all or part of the reactor system. We have indicated we desire fixed-price bids for plants and believe that equipment manufacturers rather than the publicly owned utilities are assuming the risks of overruns. Equipment manufacturers appear willing to furnish performance warranties which reflect a further risk on their part. It is, of course, not possible to completely eliminate the risk to the buyer which results from failure to achieve design performance—the

field is too new. We point out, however, that in all cases to date involving public-power groups the AEC is proposing to pay all or a major part of the capital costs of the reactor itself, and there is no intent on the part of the AEC to compel the utilities to purchase such reactors.

The principal risk that the publicly owned utility runs in connection with capital facilities, specifically the reactor, is that should they prove unreliable the utility may be faced with a temporary loss of capacity. This loss may be made up from the balance of the system, by purchase of power from other networks or by construction of a conventional boiler facility to supply existing turbines. This latter would not represent a double investment in heat source facilities since the AEC has borne the reactor cost.

With respect to operating costs which are likely to be higher than conventional operating costs, the AEC has offered a number of forms of assistance including waiver of fuel use charges and AEC-financed research and development contracts. The latter is of particular importance since the publicly owned utility or its selected development group does have an opportunity to investigate areas of operating cost reduction prior to and during reactor operation with these funds. These contracts are closed-ended and do not completely eliminate the risk taken by the utility. It should be pointed out, however, that in the worst case the utility in question has the same option described above with respect to capital facilities; namely, to abandon the reactor at the end of the contract period and to construct a conventional boiler. We do not believe the utilities involved expect or should expect to be relieved of all risks. In our view it is only through acceptance by utilities of some risks that the economic incentives will be created which will lead to maximum progress toward achievement of economically competitive nuclear power.

The Commission's Selection Board appointed to evaluate proposals submitted under the second round of the power demonstration reactor program has received excellent cooperation in its conferences and correspondence with APPA members who have submitted proposals. The proposal of one of the member utilities, the Consumers Public Power District of Nebraska, has been accepted by the Commission as a basis for detailed contract negotiations, which are now in progress.

Chairman ANDERSON. Tomorrow's session will be back in the House caucus room again. We are not able to have this room tomorrow.

Mr. Becker, will you identify yourself for the record, and give us a little idea of the organization known as the Federation of Insurance Counsel.

STATEMENT OF RALPH E. BECKER, SECRETARY-TREASURER, FEDERATION OF INSURANCE COUNSEL

Mr. BECKER. Yes, sir. Mr. Chairman, my name is Ralph E. Becker and I am a partner of the law firm of Brookhart, Becker & Dorsey, of Washington, D. C. I am presently serving as secretary-treasurer of the Federation of Insurance Counsel and have been authorized by that distinguished nationwide group of insurance attorneys to appear before this committee on their behalf. I have long been interested in the particular subject of your present inquiry, and last September I served as program chairman of the first symposium on the legal aspects of atomic energy sponsored by the Federal Bar Association.

I want to take this opportunity to thank you, Mr. Chairman, and the members of your committee, for giving me the opportunity of presenting my views to this distinguished group. Your committee and staff should be commended for their intense interest and diligent studies in the field of atomic energy which have done so much for the cause of advancing the position of the United States in the peaceful uses of the atom.

After many conferences and multiple discussions at private and governmental levels, it has become abundantly clear that private in-

dustry will not enter into private atomic energy industry without Government assistance.

The natural question is: Why?

The answer is fear? Fear of a one-in-a-million possibility. The possibility of a reactor accident—the maximum possible accident—the one in which the reactor releases its radioactive fission products to the atmosphere.

Reactors can be made safely and they can be operated safely. The published operating history of 25 reactors in the United States over a period in excess of 12 years shows no accidents involving radiation injury sufficiently serious to cause lost time of personnel during 606,686 operating hours and 17,799,000 man-hours. A similar record has been compiled in the United Kingdom. There, according to available statistics, with a cumulative experience of some 50,000 man-years, no deaths attributable to radioactivity have occurred, not a single case of permanent or temporary injury from external radiation has arisen, and the safety rate with respect to internal hazards is indicated as being a very small percentage of the best industrial rate, with no deaths and only 1 case of potential injury noted during a survey encompassing 10,000 man-years in a plant where the risk is deemed greater than most others in the industry.

Nevertheless, in spite of this remarkable safety record, the catastrophic accident remains a possibility. Dr. Edward Teller has said:

> With all the inherent safeguards that can be put into a reactor, there is still no foolproof system that couldn't be made to work wrongly by a great enough fool.

This is unfortunately still true. No scientist is willing to say that a nuclear reactor can be made 100 percent safe. And it is this remaining fraction of a percent, this small but unknowable risk, which is so frightening to the prudent investor. It is frightening because of the magnitude of the harm which can arise if the very remote contingency which is represents does actually occur.

One of the papers delivered at the Geneva Conference, attempting to estimate the amount of damages which might result from a major reactor disaster, developed figures ranging from $13 million to $950 million in property damage alone, depending upon the size of the reactor and the character of the area involved. As for personal injury, it was estimated that a full release from a large-scale power reactor would result in 200 to 500 deaths in a region of population density of 200 to 500 people per square mile, with perhaps 3,000 to 5,000 exposed to damaging levels of radiation. These are figures to stagger the imagination—especially when they are translated into numbers of damage suits which might be filed against the reactor operator, the equipment suppliers, and the component designers. We should remember also that, as to the operators, the courts will very likely invoke the principles of strict liability. And that, as to suppliers and possibly designers, the well-known doctrine of *MacPherson* v. *Buick Motor Co.* might be applied.

In regard to the liability which will be incurred by reactor operators, equipment suppliers, and component designers in the event of a reactor disaster, I am of the opinion that lawyers can, with confidence, rely on the familiar and established doctrines and precepts which have always governed tort liability. In conjunction with my

learned associate, Prof. Leo A. Huard, of Georgetown University Law Center, I made a study to determine whether the known doctrines of tort liability would be at all affected by the advent of this radically new and hazardous industry. Our conclusions which appear in an article in the Georgetown Law Journal, volume 44 of November 1955, are that the time-tested tort-liability precepts will be applicable and that the only challenge presented by the atomic industry is to the techniques and skills of legal practitioners in becoming acquainted with the basic operations and technological features of a new industry. The practicing lawyer will only have to adapt his existing talents to novel fact situations but it is unlikely that he will have to develop new talents.

The corporate director is charged by law with the highest duty of trust with respect to the stockholders of his corporation. He is a fiduciary, and as such must always look to the best interests of his stockholders. The figures quoted above with respect to the injuries to property and person which may stem from a major reactor disaster are bound to have a discouraging effect on a prudent corporate director. He will reason that he can provide a greater dollar return for his stockholders in a less risky business. This is particularly true since there is no prospect of any great profit to be made in the private atomic-enery industry in the near future.

Do the great insurance companies have a solution? Unfortunately, we must answer with a negative or, at best, with a qualified affirmative. The stock companies and the mutual companies, by pooling their interests, can dedicate a fund variously estimated at sums from $50 million to $65 million to liability arising from the private atomic energy industry. This sum is on a per facility basis and must cover all liability; for example, operator, equipment supplier, and component designer.

This is clearly not enough. These available sums will cover a substantial portion of third-party liability in the unhappy event of a reactor runaway but not necessarily all such liability. There is no way of knowing in advance, how far short these sums would fall, but fall short they surely would. This unknown quantity of uninsured liability is sufficient to discourage all but the most intrepid investors from entering a dangerous enterprise where there is little hope of realizing substantial profit for many years.

However, gentlemen, there is general agreement throughout the country that the development of a private atomic energy industry is in the public interest. Since it is in the public interest, it is the function of Congress to meet that public interest, and that is, of course, why these hearings are being held.

As the chairman of the Joint Committee has so clearly stated, these hearings concern—

> fundamental problems which may well affect the future of the entire peacetime atomic energy program.

We all hope that whatever roadblocks now seem to impede the atomic-energy program will be completely aired and solved as a result of the testimony at these hearings.

The national policy in this matter has already been declared by Congress in the terms of the Atomic Energy Act of 1954:

It is therefore declared to be the policy of the United States that—

(a) the development, use, and control of atomic energy shall be directed so as to make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security;

(b) the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise (42 U. S. C. A., sec. 2011 (Cum. Supp. 1955)).

As an interested private citizen, I have given this matter a great deal of thought, and I have the temerity to come here this afternoon with some concrete proposals which I hope will merit your favorable attention. These proposals are not entirely original with me. These concepts have been advanced before by others. I am going to announce at the very beginning that I wish to propose a form of open-end indemnity, and I hope that the chairman will allow me to continue and explain myself.

Before submitting these proposals, however, I should like to define certain terms of reference without which the proposals are meaningless. These terms of reference involve making distinctions between indemnity on the one hand and insurance on the other. Further distinctions lie within the concept of reinsurance and the concepts of reinsurance and coinsurance.

Indemnity, as I use it here, is an undertaking, express or implied, to compensate another for loss or damage or for trouble or expense incurred. An example familiar to Congress would be the various bills for the relief of private individuals which Congress passes each year in substantial numbers. Insurance, on the other hand, is a sharing of risk by a company of investors who pay a fixed premium for this purpose.

The philosophy of insurance has best been described in a statement by a select committee of the House of Commons in 1825. The committee was reporting on the losses relating to friendly societies and part of the report is as follows:

Whenever there is a contingency, the cheapest way of providing against it is by uniting with others, so that no man may be subjected to a great loss. He, upon whom the contingency does not fall, does not get his money back again, nor does he get for it any visible or tangible benefit; but he obtains security against ruin and consequently peace of mind. He upon whom the contingency does fall, gets all that those whom fortune has exempted from it, have lost in hard money, and is thus enabled to sustain an event which would otherwise overwhelm him.

A homely illustration of the difference between indemnity and insurance can be secured from the simple automobile accident situation. The plaintiff in such a negligence case when he prevails is indemnified by the judgment that is he is made whole again. The defendant, on the other hand, is insured, that is he has paid his premiums to share just this risk with the other policyholders.

In the testimony presented before you, gentlemen, there has been a great deal of talk about reinsurance. "Reinsurance" is the term used to denote the transaction whereby a person who has insured a risk insures again a part or the whole of that risk with another person. The purpose of reinsurance is to relieve the original insurer from a liability which is too heavy for him to carry. A characteristic feature of reinsurance is that there is no privity of contract between the insured and the reinsurer. And, simply to keep our terms within those

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of the insurance business, perhaps it might be well to point out here that the first insurer is called the ceding company and the second insurer is referred to as the reinsurer, the entire transaction being known as a cession.

There is also frequent confusion between the meaning of "reinsurance" and "coinsurance." Again, simply for the sake of clarity, I would like to point out that coinsurance involves a situation where the insured has a contractual relationship with both insurers. The distinguishing feature here is this privity of contract between the insured and both insurers which privity, of course, does not exist where reinsurance is involved. There are two basic kinds of reinsurance. The first is known as facultative or optional. Here, the ceding company and the reinsurer negotiate separate contracts for each risk sought to be reinsured. The second and more frequently occurring type of reinsurance is the treaty or obligatory. Here, the ceding company contracts with a reinsurer, or reinsurers, to reinsure a fixed share of every risk. Therefore, under the treaty system, the ceding company is forced to cede all risks, good, bad, or indifferent. The reinsurer is likewise obliged to accept his fixed share of all risks, good, bad, or indifferent.

With these basic considerations in mind, my proposals are as follows:

1. INDEMNITY

The Government would contract with each licensee agreeing to indemnify him for any judgment he would have to pay to members of the public above the amount of his insurance. Each licensee would agree to take private insurance in the maximum sum available to him for his particular facility, which present estimates indicate to be over $50 million, perhaps as much as $65 million, per facility. In the event of a major reactor disaster, injured members of the public would file suit in the usual manner against the operator, suppliers, or designers. The burden would be on these defendants to bring the Government in by way of third-party practice. This practice is available under the Federal Rules of Civil Procedure and is believed to be available under similar rules in all the States. Incidentally, we contemplate here that the injured member of the public would be a third-party beneficiary to the contract between the Government and the licensee within the meaning of the doctrine of *Lawrence* v. *Fox*.

We believe indemnity is the best system because it keeps the Government out of the insurance business. No new administration, commission, or bureau would have to be created to oversee this operation. There would be no necessity for the formation of a new Government insurance corporation as might be required to administer a reinsurance or coinsurance program.

It should be remembered that we are dealing here with a remote possibility—an event extremely unlikely to occur. If we erect a new Government agency to handle a Government reinsurance program, or something similar, that agency is very likely to stand idle for the next 20 years. The personnel will be engaged in shifting useless papers designed to cover a hazard which past experience indicates will never arise.

On the other hand, under an indemnity program the Atomic Energy Commission, with the addition of relatively limited personnel—per-

haps with no additions at all—will check the amount of insurance secured by each licensee in order to ascertain whether he has the maximum amount available. Then the Government qua Government rests. If a reactor disaster occurs, the private defendant has the burden of bringing the Government into the litigation, as we have indicated earlier. At that point the Department of Justice would defend the Government as it always does in civil suits against the United States.

Representative HOLIFIELD (presiding). Would that require the Government's acquiescence being brought in?

Mr. BECKER. A statute predicated upon the theory which I am advancing would, in all probability, have the effect of making the United States a party to such litigation. In normal practice plaintiffs' attorneys would, as a matter of course, bring in the United States as a party defendant.

In view of the past safety record of atomic energy installations, this would seem to be the easiest and cheapest way of providing governmental assistance to private investors who are interested in atomic energy industry. Also the already considerable bureaucracy of the executive department would not be further increased at the taxpayers' expense.

2. LIMITATIONS

The purpose of this indemnity program is to get the private atomic energy industry underway because the country needs that industry and needs it desperately. It cannot be regarded as a perpetual crutch for excessively timorous investors who may desire to dabble in this project. Its only purpose is to provide encouragement to the traditionally vigorous elements of American private enterprise. Once the enterprise becomes a going concern, there will no longer be any need for encouragement and the indemnity program may well become surplusage. There must, therefore, be a time limitation on the program.

Congressman Price has proposed 10 years as the period for his indemnity bill. Perhaps 5 years would be sufficient—after all, we are looking for strong men, not weaklings. Five years of assurance that they will not be subject to third-party liability should be sufficient encouragement for those with a modicum of financial courage.

Whatever the time period ultimately decided upon, provision should be made for "experience reports" by the licensee and by the Atomic Energy Commission to this Joint Committee. At the end of the time period—5 years or 10 years—these reports would form the basis upon which Congress can reexamine the entire industry with a view to extending the indemnity program or bringing it to an end. The emphasis in any enabling legislation should be on the temporary nature of the indemnity program.

The second limitation must be a limitation of amount. Government indemnity should begin only when private insurance is exhausted. The limitation we have in mind differs somewhat from the fixed sum limitation of $500 million suggested by Chairman Anderson. We would limit governmental liability by setting a limitation on the recovery of individual injured parties. By this we mean that each injured party would be limited to recovering against the Government whatever part of the judgment award him by a jury, not paid by the private defendant, up to a maximum amount of $25,000. In

other words, the Government would never have to pay more than $25,000 to any one plaintiff whether it be for personal or property injury. I am trying to come up with some kind of solution, and that is used in workmen's compensation statutes, whereby they do limit the amount.

We feel that this particular kind of limitation will serve to encourage a higher duty of care on the part of operators, equipment suppliers, and component designers since there remains a slight chance that they might be self-insurers for judgment amounts above the total of the contribution of the private insurer and the Government indemnity. In addition, the knowledge that the Government cannot be called upon to contribute more than $25,000 to each injured individual should serve as a brake on runaway juries which might sometimes be as great a threat to the new industry as the runaway reactor.

Representative HOLIFIELD. Would this $25,000 be in addition to the indemnity collected from the private insurance companies?

Mr. BECKER. In the event it reaches it.

Representative HOLIFIELD. Or would it be a level over which the private companies and the Government would not have to go?

Mr. BECKER. That is right. Let's assume you go beyond the risk of the $65 million. If you have a number of plaintiffs and maybe the whole amount was $50 million, the Government isn't involved at all. Let's assume it runs to $300 million. Then you know there is a point whereby the individual will be compensated, but let it run to, say, $700 million. I am giving you kind of fantastic figures. Then there will be a difference at which the operator, designer, or the company which is in business becomes a self-insurer, which he is to a great extent in normal business undertakings today, so that the person who is injured, which I will later point out, will be compensated as good as we possibly can see it at the present time, which is normal practice.

Representative HOLIFIELD. Of course, in this instance where you refer to the person who has workmen's compensation, that person is involved in work which he obtains a personal benefit from. These people would be innocent bystanders, you might say, that would not have an immediate compensation.

Mr. BECKER. That is right. I am only referring to third party liability, but I am referring to setting up a schedule for third party liability similar in that respect.

In many instances, as you know, in workmen's compensation payment at that time they provide for an eye, a leg, an arm, disability, and so forth. That protection is clear. Applying a similar schedule this could be worked under careful draftsmanship to third party liability to some extent.

There is still another area in which the Government must take an entirely different approach. We refer here to experimental reactors and general research in the field of nuclear energy which is specifically encouraged by the Atomic Energy Act (42 U. S. C. A. sec. 2051 (Cum. Sup. 1955)). We feel that in the case of universities and other nonprofit research organizations that the Government should assume third party liability entirely, since these organizations will probably be unable to secure private insurance because of the high premiums and certainly cannot act as self-insurers. The statute should be amended to that end.

Gentlemen, I am particularly anxious to stress, at this time, that this indemnification plan is for the protection of the public. It is the public which is to be indemnified, i. e., the injured party. The operator, supplier, designer, and their insurers will not get 1 penny of Government funds. The injured party only is compensated, is made whole again. The Government does not pay the operator's loss, or the supplier's, or the designer's, or insurer's.

This is, of course, merely an outline. But we think this indemnity program merits serious study. We feel that it offers the best and most practical means of giving the governmental assistance necessary to make private atomic energy industry a reality. Skillful amendments must be made to the Atomic Energy Act of 1954 in order to enable the Commission to negotiate indemnity agreements. These agreements, in turn, must be skillfully drawn so as to afford the maximum protection to the public interest.

Gentlemen, these are my views. I respectfully submit them for your consideration.

Representative HOLIFIELD. Thank you very much, Mr. Becker.

I wonder if you would care to comment on the factor of the location of these reactors in order to reduce potential liability?

Mr. BECKER. I have gone into that rather thoroughly. My associate, Prof. Leo Huard, and I wrote an article which appeared in the Georgetown Law Journal in November of 1955, and discussed the various forms of liability. I had extensive experience as a country lawyer with respect to zoning and also location of hazardous buildings and improvements. Where you are dealing with a location of an extra hazardous factor such as a reactor in a very heavily populated and intensified zone, according to testimony presented in papers at Geneva and elsewhere, the scientists feel that there would be more damage at the location. But by the same token we have found that damage could result in the pollution of water or get in the atmosphere and travel in a cloud. So you are dealing with unknown quantities at this time. That is the reason there seems to be so much fear of the danger.

However, I think that the greatest amount of damage would take place where you would have the reactor, assuming there is a runaway reactor, but I am not one of those who feel that concerned that it should not be placed in a good location rather than placing it out in the desert. I don't think that serves the purpose of a power reactor, for example.

Representative HOLIFIELD. Of course, I think we would all think within the realm of a distance that would not involve an uneconomic loss in the transmission end of the operation; 50 miles, for example. I am thinking particularly of either deliberate sabotage in time of international strained relations or the case of bombing. It is very clear that our cities are our primary targets in case we should have an atomic-hydrogen war. We also know that we are pretty vulnerable. Our defenses have lagged way behind our offensive capability and this, I think, is true of the other great power that might be an aggressor. In view of the fact that there is no overpowering urgency to have these reactors built at this time from the standpoint of the power that they would develop—we have other means of doing it and doing it cheaper, and we all admit that—the urgency would be, rather, in the field of trying to maintain our superiority, or our position at least,

in the developing of the technology. It would seem to me that with these points in consideration and working as we are in a field where the history of risk has not been established, we might take into consideration the placing of the location of these reactors outside of the great urban centers, at least 40 or 50 miles, enough to preclude the likelihood of them being struck in case of enemy attack on those primary targets. I think it would be good from several angles.

I think there are other points involved besides the risk involved. I think its location could be justified from an economic standpoint in terms of the difference in land investment, and certainly the loss in transmisssion of power would not be too great at that short a distance.

I feel like you do: that the possibility of a runaway reactor is rather remote, but I am more concerned with the possible hazard of sabotage and enemy attack than I am with a runaway reactor type of hazard, and knowing the degree of radioactive poison that could be reached in one of these reactors, I just wonder at this stage of the game if we are justified in taking the risk outside of the financial problem that is involved.

Mr. BECKER. My contention, Mr. Congressman, is that as a matter of practicality, power reactors in the United States will not be established contiguous to large population centers. This is true because at the present time numerous forms of conventional power reactors are more efficient and more reasonable than the atomic energy reactor. Thus we will probably see reactors established in remote areas which may in the not too distant future be surrounded by population centers due to the natural expected population increases. In other words, since atomic reactors are probably not wanted or needed near large cities, it would be expedient to place them in outlying areas which will not be populated for some years. Thus will they serve to supply future power needs in the event that other resources are exhausted. And, in addition, we will then have the experience of years of operation from which we will no doubt have benefited safetywise.

Representative HOLIFIELD. There is the trend in conventional power now to move generating equipment across to the mine power.

Mr. BECKER. Oh, yes; very good.

Representative HOLIFIELD. And they find that the transportation of fuel is more costly than the cost of capital investment of transmission lines.

Mr. BECKER. That is right, absolutely so. So those are the factors you have to weigh, but on the question of the hazard, the point you make about the farther the distance from the dense population, of course, is always a sound one.

Representative HOLIFIELD. Of course, there is always a possibility of the growth of population, too, in a period of the life of the reactor which, we will assume, would be possibly 20 or 30 years, but in that case the population would knowingly be moving up to it. The hazard would not be brought to them. It would be population going to it rather.

Mr. BECKER. That is perfectly true in connection with the area where you come from. If you set it up 10 years ago, you placed it 10 miles out of a certain point, and today it would be in the heart of the city.

Representative HOLIFIELD. That is right. That is one of the things, that population trend and growth would have to be considered prob-

ably in the criteria of setting these plants up if the element of distance is considered as being one that might either increase or decrease the cost of the insurance.

Mr. BECKER. Of course, as a lawyer, I couldn't very well answer the technical questions. That would be for the engineer, of course. However, there is one thing that does disturb me and that is that you also want to avoid a psychological fear, because you can recall the instances where you had tremendous powerplants, water plants, these tremendous dam pipes, and people would say, "It is going to destroy the values of the area," and people won't come near it. Of course, there were a lot of cases of that. If it isn't a nuisance it is there for a specific purpose. It may not be the hazard we think it is, but as far as we are concerned, the scientists and engineers are confused as to that point at the present time. Nevertheless, there is that one chance out of a million that there would be a runaway reactor.

Representative HOLIFIELD. Without accepting your one chance out of a million, and I know what you mean, it does seem we are in a period of development of technology now where we do not have to make rigid arrangements for all time, but it seems like we should deal with this question on an interim basis and reduce the cost to the investor in the reactor as much as possible, not only the cost of this initial investment, but also the cost of operation; and, of course, if you do have a high insurance cost whether it is up to the extent of your suggested 50 or 65 million dollars liability by the owner of the reactor and an additional cost beyond that to the Government, I can see where that might have quite an effect upon the cost of operation.

Mr. BECKER. By the way, Congressman, on the question of the indemnification program I referred to, there should be no premium charge whatsoever. It is not an insurance program at all.

Representative HOLIFIELD. No. That would really be an acceptance by the Government of this area of risk liability.

Mr. BECKER. And that is the other reason why I advanced the proposition with respect to research reactors. There should be complete indemnification with no insurance. I mean it is for the public good and it is in the public interest, and universities, and colleges, and other such institutions couldn't afford to pay insurance premiums.

Representative HOLIFIELD. That is true, and of course the Government has accepted complete hazard, as we know, up to date.

Mr. BECKER. Yes; they have.

Representative HOLIFIELD. However, there has been unusual care, I think, shown in isolating the reactors from great centers of population.

Mr. BECKER. There is a recent book—I received it in the last 2 days—a very well-studied treatise by Mr. Stason, dean of Law School of the University of Michigan, which compiled all of the safety statutes and regulations to date in the various States affecting the atomic industry, and it is very interesting the way they have protected the interests of the public. They have made tremendous research and they have come up with quite a study on the subject, so on the question of safety they have gone pretty far on the subject matter.

Representative HOLIFIELD. Yes. I am not so sure that the Federal legislation will be the last word on the location of these reactors.

Mr. BECKER. No. States and communities will have a lot to say about it.

Representative HOLIFIELD. Thank you very much for your testimony.

Mr. BECKER. Thank you very much for the opportunity. I understand that Senator Anderson has requested my views on a couple of additional points, which I would like to submit by letter at a later date for the record.

(The letter referred to follows:)

BROOKHART, BECKER & DORSEY,
Washington, D. C., June 5, 1956.

Senator CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Washington, D. C.

DEAR SENATOR ANDERSON: At the conclusion of my recent testimony before your committee, I was requested to submit my comments on two specific questions. In the pages which follow, I have attempted to comply with that request to the best of my ability.

I. WHAT ARE YOUR COMMENTS ON THE AEC PROPOSAL, PARTICULARLY AS TO GOVERNMENT REINSURANCE?

The AEC proposal apparently espouses the principle of indemnity but suggests that the Commission would be satisfied with a reinsurance program.

In my testimony of a few days ago, I discussed both of these plans and indicated my personal preference for a modified form of indemnity.

Indemnity is a word of broad significance. In its simplest meaning it is an undertaking, express or implied, to compensate another for loss or damage or for trouble or expense incurred. This is the sense in which I used the term and which the AEC proposal is apparently intended to convey.

This indemnity, as I understand it, would inure directly to the benefit of the injured party without payment to any intermediary. Neither the insured nor his private insurer would receive any funds. The injured party would be paid directly by the Government any sum which the private insurer or the insured (the facility-licensee) are unable to pay him for his injuries. It is important to note that the Government compensates the injured party, not the insurer nor the facility-licensee although the indemnity agreement is with the facility-licensee. (See statement of Ralph E. Becker before the Joint Committee on Atomic Energy, Congress of the United States, May 17, 1956, pp. 8–12.)

Reinsurance is a contract whereby the reinsurer agrees to assume the whole, or a part, of a risk undertaken by the original insurer (sometimes called the ceding company). It is personal between the insurer and the reinsurer, and the original insured is no party to it. The original insured acquires no rights under the contract of reinsurance unless the reinsurer specifically agrees to pay him. (Vance on Insurance, 3d edition, 1951, pp. 1065 et seq.)

Normally then, under a reinsurance program, the Government reinsurer would pay the original insurer and not the injured third party. Reinsurance is, in a sense, indemnity but it is indenmnity for the insurer and not the party who is actually hurt. I stress this distinction now, since I perhaps did not express it with sufficient clarity in my testimony or my statement of May 17, 1956.

Basically, both systems (indemnity and reinsurance) will achieve the same result, i. e., compensation to third parties for injuries received where private insurance or self-insurance cannot provide such compensation. There can be no quarrel with this result since it has become apparent that prospective facility-licensees are unable or unwilling to pay the necessary amounts, and, that private insurance cannot furnish adequate coverage. If the private atomic energy industry is to have a future, we must have either indemnity or reinsurance.

I prefer indemnity to reinsurance. I think indemnity is simpler, easier to understand, and more appealing to the mass of people. Reinsurance is cumbersome, time-consuming, and costly. It places the original insurer between the Government who is actually doing the pay and the injured party, who is to receive this payment. (See statement of Ralph E. Becker, supra, p. 9.)

There seems to be no good reason why an indemnity program could not be administered inexpensively and quickly from a prearranged fund without the creation of excessive bureaucratic interference. In my statement I described in some detail one way in which such a scheme could be carried out. (See statement of Ralph E. Becker, supra, pp. 8–10.)

My conclusion then is that reinsurance is a poor second choice. It reaches the same objective as indemnity but only through a more devious course. Reinsurance, as applied to this problem, is doing a simple thing the hard way.

II. WOULD REINSURANCE POSE ANY LEGAL PROBLEMS FOR PRIVATE INSURERS UNDER STATE INSURANCE REGULATIONS?

This question is not susceptible of an easy or complete answer. Wisdom dictates the anticipation of some difficulty concerning State insurance regulation with respect to reinsurance in the private atomic energy industry. However, we must immediately take into account the fact that the reinsurer in this case is to be the Federal Government rather than a private entrepreneur. Therefore, there is grave doubt at the very outset that State laws and regulations designed to control private insurance enterprise would have any valid application to an arm of the Federal Government. It is somewhat preposterous to assume that a Federal agency would be required to qualify under the insurance laws of a particular State. The nature of reinsurance indicates that this problem will not arise. There will be no occasion for any direct conflict between a Federal and a State agency nor will an opportunity arise for a State to attempt the exercise of direct jurisdiction over a Federal agency.

Reinsurance would require that the atomic energy facility initially secure all of its third-party liability insurance from private companies. These private companies would then enter into separate cessions or general treaty arrangements for reinsurance of part of this risk with the designated Federal agency as reinsurer. This is necessary to preserve the independence of the insured from the reinsurer implicit in the classic reinsurance scheme. In reinsurance, by definition, there normally is no contractual privity between the insured and the reinsurer.

The cession would undoubtedly be executed at the business situs of the reinsurer which would be Washington, D. C. The contract would then be subject to Federal law, especially since it would usually be a part of an interstate transaction. It should be noted that this cession is a Government contract—a contract with the sovereign—subject to the complex body of law which controls the negotiation, renegotiation, and rescission of such contracts. Disputes over such contracts would be resolved according to different principles than disputes over agreements between private parties. The suability of the Government contracting party would remain an underlying issue unless resolved by Federal enabling legislation.

These considerations would seem to preclude State regulation of the reinsurance contract itself, and of any dispute arising after the execution of such a contract. State regulation would then seem to be limited to precontractual matters involving the facility-licensee (the insured), and the ceding insurance company. The cession itself and the reinsurer (the Federal Government) would be outside the scope of direct State control.

We may reasonably anticipate that the States will regulate the amount of third-party liability insurance which each facility is required to get. It is entirely possible that particular States may specify a stipulated amount as a condition of doing business in the State. A facility-licensee might well be prevented from beginning operations until the State insurance commissioner is satisfied that his third-party liability insurance coverage is adequate.

All of a State's insurance laws and regulations would, of course, apply to the original insurer. He would have to be fully qualified under State law and would have to comply with all of the State's insurance laws and regulations in his day-to-day operations.

It is here that the State could control the original insurer's reinsurance program and, thus, indirectly affect the policies and practices of the reinsuring Federal Government agency. The State could specify the amount to be ceded by the ceding company. They could set maxima and minima on the ceded risks.

On the other hand, the reinsuring Federal agency might refuse to accept the amounts of limitations thus dictated by the State. The ceding company and through it, the facility-licensee, would be placed in a very unpleasant dilemma. Such a conflict between these sovereignties would set up a roadblock to the development of the atomic energy industry.

In summary, reinsurance presents a troublesome and cumbersome prospect of indefinitely overlapping State and Federal regulation. Direct conflict between these two spheres of regulatory activity is unlikely but not impossible. Even without direct conflict, however, there remains an area of possible duplication and of friction in adjusting to the demands of both sovereignties. Indemnity,

open-end or limited in amount, would give the same protection without these complications which are inherent in a reinsurance program.

This reply to your question is not exhaustive. It could not be in the short span of time which has elapsed since the hearings. This report merely indicates, in a general way, some of the problems likely to arise. It is perhaps of some significance that the only comprehensive survey of State regulation of atomic energy fails to mention the problem raised by your second question. (See Stason, Estep and Pierce, State Regulation of Atomic Energy, University of Michigan, 1956.) A complete answer to your second question would require a detailed analysis of the insurance laws and regulations of every State in the Union. Perhaps the committee would find it desirable to encourage such a project.

Respectfully yours,

RALPH E. BECKER.

Representative HOLIFIELD. This will conclude the hearings for today.

(Whereupon, at 4:25 p. m., Thursday, May 17, 1956, the hearing was recessed until 10 a. m., Friday, May 18, 1956.)

GOVERNMENTAL INDEMNITY

FRIDAY, MAY 18, 1956

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The committee met at 10 a. m., pursuant to recess, in the caucus room of the House Office Building, Hon. Melvin Price presiding.

Present: Senator Anderson (chairman) and Representative Price.

Present also: James T. Ramey, executive director, George Norris, Jr., George E. Brown, Jr., Wayne P. Brobeck, and David R. Toll, of the Joint Committee Staff.

Representative PRICE. The committee will be in order.

This is a continuation of the Joint Committee on Atomic Energy hearings to receive testimony on proposed legislation for a governmental indemnity or insurance program to supplement private insurance coverage of reactor hazards to the public.

The first witness this morning will be Mr. Hubert Yount, vice president of the Liberty Mutual Insurance Co.

Mr. Yount, will you come around, please.

STATEMENT OF HUBERT W. YOUNT, AMERICAN MUTUAL ALLIANCE

Mr. YOUNT. Mr. Price and members of the committee, I have not made an attempt to present a fully documented statement. In fact, I have had very little opportunity to do so since I received the invitation to appear.

What I would like to do is read the statement I have prepared and offer some comments at some points and answer any questions that might arise.

Representative PRICE. We will be very happy to have you do so, Mr. Yount.

Mr. YOUNT. My name is H. W. Yount and I am vice president of the Liberty Mutual Insurance Co., of Boston, Mass. For the past 15 months I have served as a member of the insurance executives study group working with the Atomic Energy Commission toward the development of a private insurance program to provide coverage for nuclear radiation hazards. I am appearing today on behalf of the American Mutual Alliance, a trade association with headquarters at 20 North Wacker Drive, Chicago, Ill. The membership of the American Mutual Alliance consists of 118 mutual fire and casualty insurance companies which collectively write premiums in excess of $1 billion annually. These companies do business throughout the United States. Some of them write all lines of business in their class through-

out the United States, while others confine themselves to a limited number of coverages in restricted area. In size they vary from relatively small companies to relatively large companies.

The insurance companies of our mutual organization have been keenly aware of and interested in the insurance problems arising from the development of nuclear energy by private enterprise. We have felt a serious obligation to do everything possible to cope with this new and unusual hazard and to work with other interested segments of the insurance industry to provide a solution to the maximum extent possible.

Perhaps it will be of assistance to your committee if some of the problems affecting insurance can be highlighted in order to demonstrate the unusual nature of the problem.

1. The hazard is new. It differs from anything with which our industry has previously been called upon to insure. Its potential is still unknown and must, therefore, be evaluated currently in terms of a body of knowledge which is expanding from day to day.

2. Insurancewise the problem is presently limited to a very few small installations so that to date there has been no extensive demand for immediate insurance coverage. It is still a matter of future possibilities and probabilities. However, present and potential licensees need immediate commitments on future insurance capacity before undertaking construction contracts.

3. Very few insurance companies have had any opportunity to develop firsthand knowledge of the problems involved because of the present limited scope of operation. By the same token, very few insurance companies have developed trained technical personnel to assist their underwriting personnel in insurance evaluation of the hazards involved.

4. The atomic art—or perhaps I should say "arts"—is still new and experimental. There can be no standardization until a great deal of experimental work has been done. It should be obvious that insurance during such an experimental period is an extremely difficult operation since the essence of insurance implies some standardization of operation and hazards.

5. The fact that the development of nuclear energy for peaceful purposes has arisen through the channel of the conversion of weapons has provided a psychological barrier from an insurance standpoint. Many insurance men and most laymen still think of an atomic reactor as a potential bomb.

6. The restricted character of information dealing with the development of atomic energy has been a handicap to the development of widespread insurance interest perhaps because of a feeling that anything confidential must involve elements of considerable danger in order to be so treated. Substantial progress has been made by the Atomic Energy Commission in dealing with this problem and it is probably fair to state that at present it is not too much of a handicap.

7. The catastrophe hazard is apparently many times as great as anything previously known in industry and therefore poses a major challenge to insurance companies.

Presumably most of the above points have been covered by previous speakers and I shall not dwell upon them. I would like, however, to comment briefly about the catastrophe potential of the larger power

reactors which has created the major problem of insurance capacity. We have heard estimates of catastrophe potential under the worst possible circumstances running not merely into millions or tens of millions but into hundreds of millions and billions of dollars. It is a reasonable question of public policy as to whether a hazard of this magnitude should be permitted, if it actually exists. Obviously there is no principle of insurance that can be applied to a single location where the potential loss approaches such astronomical proportions. Even if insurance could be found there is serious question whether the amount of damage to persons and property would be worth the possible benefits accruing from atomic development.

Our conclusion is that ways simply must be found to develop this new source of energy in such a manner that possibilities of such extensive loss will ultimately be eliminated. We have presented the matter to our companies as one in which scientific developments are certain to bring about positive and definite controls under which ultimately there should be no possibility of such extremely serious damages. In our work with the insurance executives study group we have been impressed by the quality of the engineering and scientific personnel working on the problem, their respect for the hazards involved and their ingenuity in developing safe methods for the utilization of nuclear energy. Perhaps as insurance men we should not be quite so optimistic but we are convinced that if scientific progress continues at its present rate that the possibility of extreme catastrophes should be eliminated for all practicable purposes within the next 5 to 10 years. In the meantime, if the evaluations of the technical personnel who have been intimately associated with the problem are correct, it seems fair to state that there is some possibility of catastrophes in excess of the capacity of the insurance industry as presently constituted to handle them and this presents the major problem before your committee. This is especially true of damages to persons and property outside the immediate atomic powerplant—the so-called third party liability hazard.

The insurance industry has approached the problem of providing the necessary coverages by an attempt to mobilize the resources of the entire domestic fire and casualty insurance industry. Other speakers have presented the story on the two casualty and physical damage pools or facilities organized by the stock-insurance companies. I should like to comment briefly about what our mutual companies have done. It was recognized at the outset that the development of insurance capacity in this area required the widest possible company participation. Accordingly, letters of invitation were addressed to every mutual insurance company in the United States having a policyholders surplus of $1 million or more. These companies were invited to subscribe to a mutual pool which would cover both third party liability and physical damage, separately or combined, in a net amount to be retained directly by the company and not reinsured in any way to the extent of 2 percent of their policyholders surplus. Most of our mutual companies in the casualty insurance field today retain net amounts at risk on a single location perhaps not exceeding 1 percent of their surplus. Net retentions in the fire insurance business are occasionally higher, particularly on the part of smaller companies. It was felt reasonable to ask for an increase in normal retained amounts

of coverage because of the unusual nature of the problem with which we are faced. To date, 103 mutual companies have contributed a net direct capacity in excess of $11 million and other companies may come in later. The mutual pool has been in operation for several weeks. Requests for coverage are now being processed. We still have the problem of working out cooperatively with the stock facilities and rating organizations basic definitions of coverage and the rating formulas which must be applied. This is essential because it is assumed that the full capacity of all 3 pools will be required on many installations and partial capacity of the 3 pools on many more.

All of the pools of facilities, both stock and mutual, are attempting to develop additional insurance capacity outside of the United States market. The prospects are very good for the development of substantial capacity and it seems probable that the aggregate capacity for third party liability insurance of approximately $65 million, as previously reported to your committee, may be realized.

The coverage to be afforded in connection with the catastrophe potential on third party liability for damage to persons and property presents a rather acute problem with which the industry proposes to deal on the best practical basis. In connection with the operation of a reactor, we will have the hazards of operation as well as the hazards arising out of defective parts and equipment. Therefore the cause of an unfavorable event may be traced to the builder, the designer, the contractor, or to the manufacturers of the various component parts, including fuel assemblies. Any one or more of these varied interests might be held liable at law for the entire damage resulting from reactor failure. There is not enough insurance capacity to provide each of the varied interests with the total aggregate amount of available coverage. Therefore, one aggregate amount of coverage will have to be made available covering all interests at one location. In view of the fact that the several pools or facilities are using the total available capacity both in the United States and abroad, it would appear that such aggregate amount is all of the insurance that will be available for any and all interests involved.

One question before your committee is whether there should be Government participation in insurance or indemnity for damages in connection with the atomic energy program. Our companies are in principle opposed to Government insurance in competition with private insurance. However, it must be recognized that there are areas which private insurance has not yet been able to handle. The present atomic catastrophe problem may be one such area. If we have done the best we can to mobilize all the insurance capacity available and this is not enough, our industry can have no reasonable objection to Government participation above the amounts available through private channels on an indemnity basis if it should be found to be necessary. We have reviewed the problem rather thoroughly with the interested power and manufacturing companies. We have a good deal of sympathy for their position to the effect that during the developmental period they should not be asked to put themselves out of business through the possible assumption of uninsured catastrophic liabilities. Therefore, the conclusion of our group of companies is that we should raise no objections to a governmental indemnity program above the limits of private insurance available if it should be found desirable in the public interest.

We recognize that with the acceptance of such a principle it becomes necessary to decide what amount of coverage is enough and the attachment point for Government participation. If legislation is to be proposed there must be some governmental authority established to determine at specified intervals the extent of private insurance capacity available. Policy will have to be established as to whether there will be a single attachment point for all types of installations regardless of size and inherent hazard, or whether there should be a different point for different types of installations.

The approach to insurance limits proposed by our industry through provision of an aggregate third party liability limit with respect to the hazards arising at any one location provides an easy method for Government assumption of loss above the predetermined attachment point at such location. We believe legislation, if proposed, should establish clearly that Government participation is an actual excess of any such insured aggregate liability imposed by law and providing additional protection for all insurable interests at such location. Otherwise it would fail of its purpose.

In the event Government participation is proposed, we believe that your committee should have clearly in mind the nature of the third party losses likely to arise. The first category of such losses are those arising from damage to persons and property of individuals or corporations under which claims will be filed directly by the injured parties involved. A second category of losses will arise as subrogation claims filed by insurance companies who have been compelled to pay losses under their policies and in turn pursue their rights at law to collect from the primary interest responsible for the loss.

A good illustration of such a subrogation loss would arise when radiation produces injury, damage or death to the employees of another corporation which losses are paid under workmen's compensation policies. These injuries would then become the basis for third-party claims, based upon negligence, against the operator of the reactor and other interests involved. Against these third-party claims the workmen's compensation carriers have subrogation liens. A second source of such subrogation claims might arise from the field of property insurance in which damages to property from radioactive contamination might be held to be the result of a fire or explosion, in which event the fire-insurance company required to pay the loss would pursue its common-law remedies against the party responsible for the loss.

It is entirely proper to include such subrogation losses in measuring aggregate third-party liability since the atomic energy project is legally responsible. Furthermore, the basic hazards contemplated by such underlying policies contain no price provision for any such radiation damage and the insurance carriers involved will have collected no premium for the hazards for which they may be required to pay under their policies. It is suggested, therefore, that specific provision be contained in any proposed legislation making certain that the coverage contemplated applies to the aggregate of all claims arising as third-party claims whether as direct claims or as claims under rights of subrogation.

Representative PRICE. You say it is suggested that there be a specific provision. Have you had an opportunity to read over the suggested legislation from the Commission?

Mr. YOUNT. I received a copy of that bill late yesterday and I have had no opportunity to study it. I am sorry.

Representative PRICE. You are not certain whether that bill would contain such a provision as you suggest?

Mr. YOUNT. I am not. This was prepared over the weekend, really, and I had seen no proposals at all at that time.

Representative PRICE. So that these comments are without any reference to any of the proposed bills, as a matter of fact?

Mr. YOUNT. I was attempting to state what I thought were fundamental principles that should be given consideration.

Representative PRICE. I see.

Mr. YOUNT. From time to time proposals have been made to limit by statute, the aggregate liability imposed by law upon the owner of an atomic reactor. Several such proposals are now before your committee. Perhaps such proposals stem from legislative precedents establishing maximum amounts recoverable at law for wrongful death or precedents in admiralty law. We doubt the advisability of such legislation, in connection with atomic hazards, as a matter of sound public policy. We recognize the intriguing possibilities of meeting this problem of a very serious possible hazard by legislating the maximum amount of recoverable loss—would such a precedent invite the elimination completely at a later date? Would there not be a demand for substitute "relief" in the event of serious loss? Would the establishment of maximum legal liability through legislation, if valid, remove the pressure to conduct a safe operation? Or at least furnish an incentive to a less safe operation? And how can you deal in this manner with the numbers of insurable interests involved in connection with each installation?

We have no answers to these questions. They are listed to indicate some of the reasons why we object to such proposals. It has been our hope that we might find successful means of utilizing this new source of power within the framework of our existing legal systems and without undue damage to existing social concepts.

In your letter of invitation you have asked for estimates of insurance costs. We appreciate fully the importance of costs in connection with this program. It is unfortunate that our insurance syndicates and pools had not been completed at an earlier date so that we could move into the problem of cost determination in advance of these hearings. At the moment I can only offer the following suggestions in connection with this problem.

1. The term "reasonable" is a relative term. Since this is an entirely new insurance hazard there is no existing standard of reasonableness that can be applied.

2. In our opinion, insurance costs for third-party liability coverages should vary in accordance with the power level of the reactor, the location, the exposure to persons and property, and the measurable safety features of operation and containment and other factors which our underwriting committees will have to consider.

3. We have never before been called upon to provide limits of liability in the amounts now under consideration. We have no statistical probabilities with which we can work other than educated scientific conjectures. Therefore, our rates will be largely matters of judgment based upon the best knowledge available.

4. You inquire as to probable maximum and minimum rates. We can only offer a speculative observation that the minimum rate should bear some analogy to the minimum rate of interest on the part of lending institutions for the unused portion of large demand loans. If the insurance industry is asked to make available $100 million on demand they will estimate the value of such demand service on a minimum financial basis, and this minimum would be increased by the probability of loss.

I should add parenthetically that that is merely my own observation. I think it has some bearing on the problem, and I thought the committee might be interested in that aspect.

For instance, if a corporation goes to a bank and asks for a line of credit of $100 million, the bank will say, "You can have it and for what you actually use you will pay a rate of interest at the rate of 3 percent or something of that sort, and for what you do not use you pay a minimum rate for the right to demand it."

5. Because of the catastrophic hazard to be insured it seems probable that rates will be in terms of percentages of the amount of liability carried. In this respect they will be more analogous to rates for fire insurance than for other forms of casualty insurance normally related to payroll, sales or other measures of operating exposure.

Parenthetically, the reason for that, of course, is that the hazard potential can only be measured by the amount of loss there might be in this case, whereas in an ordinary industrial plant or a store on the average the hazard does bear some relation to the number of people involved, and their payrolls or their volume of sales.

We regret that we cannot be of more specific assistance to your committee at this time. If we can be of assistance later our facilities are at the disposal of the committee.

Representative PRICE. I think that that is a very clear statement, Mr. Yount. I note from your statement on page 3 it indicates that the mutuals have not fully realized their anticipated participation in the overall pool, is that correct?

Mr. YOUNT. All of the pools have asked for net domestic capacity and they are asking for foreign capacity. Our mutual pool has realized all of the domestic capacity it asked for and that is the basis for putting it into operation. We passed that on April 25. We are in operation.

We are negotiating with the foreign market to supplement that capacity and, in fact, I just returned from London to discuss with the London underwriters that problem. I think that the three pools are going to get substantial capacity. How it is going to be split is still a question.

Representative PRICE. You do not think that there is any doubt at all that they will take at least the $65 million amount?

Mr. YOUNT. I would not say that there is not any doubt at all. But I would say the prospects look very good.

Representative PRICE. The question of the rate has been one, of course, which we have discussed almost with every witness. It is a very difficult matter. We realize that it is difficult.

Would you take into consideration the ability of the utilities to pay the rate in fixing a rate?

Mr. YOUNT. As an insurance man, I am afraid that I would have to predicate my rates on how much I would be expected to pay out, and not on the ability of the payee. I realize in some quarters of public undertaking that has been suggested occasionally as one measure.

Representative PRICE. The reason I raise the question is because it has been raised here in the hearing. There is some fear that the rate might be so high that they would not be able to participate in the program.

Mr. YOUNT. All I can say on that, Mr. Price, is that I suspect initially the rates may appear a little high, the first year, to some people. On the other hand, I am impressed by the fact that the people that know most about it, that have been working with it longest, are most vitally concerned about this question of a high aggregate catastrophe and the necessity for protection. That indicates to me that if the hazard of an extreme catastrophe were extremely remote, perhaps they might not be quite so concerned. For that reason, I think that our insurance industry is going to try and come up with what appears to be a reasonable balance between what they think they should get and what appears reasonable to the buyer.

I do not think that you are going to find us in any position of being arbitrary, but by the same token we have had to develop capacity over some 400 insurance companies all around the world and in order to develop that kind of capacity it takes a little premium to get them interested.

Representative PRICE. We have been talking a lot about the matter of rate. Does your organization have set up at this time and on this particular problem a special group studying this rate matter exclusively, or are you working at it right now?

Mr. YOUNT. Our pool is fully organized. We have an underwriting committee, and an inspection committee, and a committee working on forms and a committee appointed to work with the other syndicates on rating formula. We are set and waiting for them to get going, really.

Representative PRICE. You have not reached a point where they have come up with any tentative answer?

Mr. YOUNT. Only as to the basic principles that there should be some, what we call schedule rating. In other words, it is varying the rate according to different circumstances about the risk. I think we are all agreed on that.

Representative PRICE. I notice in your point 2 on page 1, you mention that there has been no extensive demand for immediate insurance coverage. Have any of your group up to this time had requests pending for immediate coverage?

Mr. YOUNT. Well, my own company has a half a dozen customers that are working on the problem and we have a number of technicians with "Q" clearances that have been working with them in the development of their proposals. But they are still on paper. By "immediate," you mean coverage that would start immediately?

Representative PRICE. An actual application, also.

Mr. YOUNT. Yes.

Representative PRICE. Do you have actual applications?

Mr. YOUNT. Our own company has no actual applications. The mutual pool has, I think, 2 or 3 preliminary applications for coverage to become effective within the next 30 or 60 days.

Representative PRICE. Can you give us any idea of in what amounts?

Mr. YOUNT. Those are for fairly small amounts. These are small operations, and I think that the amounts of coverage on each will probably not be over two or three million dollars.

Representative PRICE. Mr. Yount, as you have made clear in your statement, we are dealing with an unknown as far as the catastrophic disaster we have in mind exists. We all, I think, feel that it will never happen. We also recognize the fact that it could happen and because we recognize that, that is the reason we are here studying this problem of insurance.

You have mentioned in your statement, if I can find your exact words here, "We have heard estimates of catastrophic potential under the worst possible circumstances running not merely into millions or tens of millions, but into hundreds of millions of dollars."

While we have heard those estimates, we are more familiar with the actual safety record of the atomic energy program through the years. I think this would be a good point to read it into the record. We have it in other records.

But in the whole history of the atomic energy program, not only for the United States but similar good programs of safety have been made in the British program—the only experience available indicates that the probability of reactor accidents involving extensive radiation damage is extremely remote.

That is on the basis of what experience we have had at the present time.

There were no accidents in the United States involving radiation injury sufficient to cause loss of time of personnel during 607,000 reactor operating hours, and nearly 18 million manhours of exposure in reactor plants from 1943 through 1954.

Actually, the safety record of the program has been amazing, and marvelous. We still cannot lose sight of what we fear could happen.

Mr. YOUNT. I think it is desirable to have those figures in the record, and I think it is on the basis of the figures similar to that, and our observations in connection with the insurance study group that we have recommended to our companies that they go ahead on this insurance program. After all, it takes a little salesmanship to convince a lot of companies that know nothing about it that they should come into such a program and it is figures of that sort that have been instrumental in convincing them.

Representative PRICE. I think that those are all of the questions I have, Mr. Yount.

The committee certainly appreciates your cooperation, and the fine statement that you have presented here this morning.

Mr. YOUNT. Could I add one point, Mr. Price?

Representative PRICE. Certainly.

Mr. YOUNT. I think it is very important to realize that in convincing these companies, large and small, to come into this program, we have done it on the basis that the tight controls that have been exercised over licensing, and over the evaluation of new projects, and over the method of operation an so on, were going to be continued. That is

that the Reactor Safeguards Committee or some similar body would be continued.

The insurance industry, I think, is most concerned that the present standards of safety and operation will be maintained and what has been done to date by way of establishing sound operating procedures will be continued.

Representative PRICE. Mr. Yount, I would like to inquire whether there would be any objection on the part of your association to including in the record the statement which you presented to the committee in regard to your average manual rates on the industry, particularly chemical manufacturing industry?

Mr. YOUNT. It has very little, if any application to the present problem, but I have no objection to including it.

Representative PRICE. I am not going to make the request at this time, but I wanted that permission from your group in the event the committee so decides.

Thank you very much, Mr. Yount.

The next witness will be Mr. Tom Pickett, executive vice president of the National Coal Association.

Mr. Pickett, we are very happy to welcome you before the committee again.

STATEMENT OF TOM PICKETT, EXECUTIVE VICE PRESIDENT OF THE NATIONAL COAL ASSOCIATION

Mr. PICKETT. Mr. Chairman, my name is Tom Pickett. I am executive vice president of the National Coal Association with offices in the Southern Building, 15th and H Streets, Washington, D. C.

The National Coal Association is the trade organization of the bituminous coal mine owners and operators, whose total production is two-thirds of all the commercial bituminous coal produced in the United States.

When at an appearance before this committee in February of this year, I set forth at some length the position of the bituminous coal industry with respect to the development of atomic energy. Since the purpose of the present hearing is to determine what legislation is necessary to cope with the possibility of atomic disasters in the power program, I will not repeat the details of the coal industry's position which have previously been submitted. However, in general, the coal industry recognizes the need for Government support of the national laboratories to conduct the basic and applied research in atomic energy; recognizes the need for continuation of the Government's power demonstration program up to certain limits; recognizes that public interest requires atomic energy be utilized principally in ways or processes that contribute efficiently to the energy requirements of this Nation and the world; and recognizes that, in so doing, the national laboratory effort be directed toward minimizing fuel-processing costs, increasing the safety factors against the public hazard and developing high-temperature materials of construction.

Let me remind you at this point that the United States is one of the few nations of the world blessed with sufficient reserves of fossil fuels to meet the Nation's power requirements at low cost for centuries to come. In the United States the most economic source of steam-gen-

erated electric power in the foreseeable future will be plants fueled by coal, oil, or natural gas. The coal industry stands ready to meet the Nation's power needs for many centuries to come, without subsidy in any form and without endangering the safety of our citizens.

We are concerned, as we believe all citizens should be, with the problem immediately under consideration, and we hope that our views will be of some assistance to this committee in determining upon a proper course of action.

Within certain limits, we believe the Government should undertake to indemnify, to the extent that money can compensate for the injuries and loss of life which may arise, against injuries and damages which may occur in the operation of nuclear power projects.

From the information available at this time, it seems apparent that the extensive development of nuclear power cannot go forward unless the Government either (1) agrees to indemnify the operators of such plants against liability arising from disasters, or (2) undertakes the ownership, construction, and operation of all nuclear plants. It appears that insurance against atomic disasters will be available in amounts limited to $50 million or $60 million per disaster, whereas the possible liabilities range from hundreds of millions of dollars to billions of dollars.

It would seem that it matters little to the people who may be affected by an atomic disaster whether the nuclear-power program proceeds under private enterprise with Government indemnity or under outright Government ownership. In either event, the burden of risk must fall upon Federal Government because no other possible adequate source of indemnity is available. The development of atomic energy should be kept within the principles of our free-enterprise system insofar as it is possible to do so. Keeping the nuclear-power program within the principles of the free-enterprise system to the greatest extent possible will result in a lower financial burden on the Federal Government. For these reasons, the bituminous coal industry feels that the Federal Government should provide indemnity against liabilities arising out of atomic disasters within certain limits to be prescribed by law.

The limitations upon the Government indemnity should include a requirement that the owner or operator of a nuclear facility should be required to purchase insurance to the greatest extent available, and Government indemnity should be available only insofar as the actual liabilities exceed the insurance purchased.

Government indemnity should be available only for one of each basic type of the reactors which constitute a part of the present atomic energy development program. The legislation enacted should not authorize Government indemnity for plants which may be subsidized under a simple expansion of the present experimental program. If such an expansion of the experimental program becomes necessary, the Congress should reserve to itself an opportunity to reconsider the disaster indemnity question by requiring new legislation at that time. This opportunity to reconsider will be available if the legislation now under consideration is limited as herein set forth. In the present state of uncertainty it would be unwise to commit the Government to such an unusual program for an extended period of time.

We want to emphasize here two points. First, Government indemnity against disaster, and all other subsidies of atomic development,

should be available only for plants which will produce new information, information which will supplement existing knowledge and contribute to the advancement of the nuclear-power art. The Government should not subsidize in any way projects which appear to duplicate each other.

Second, Government indemnity against atomic disasters, and all other subsidies of atomic development, should not be available to nuclear powerplants which may be constructed after atomic energy is considered to have passed the experimental stage and reached the competitive stage. If and when the development of the atomic-energy art reaches the point where it can contribute to the energy requirements of this Nation on a competitive basis, then all Government subsidies should cease.

We think that Congress should require that experimental and developmental nuclear plants constructed with the aid of Government indemnity against disaster liabilities, or with the aid of other Government subsidies, be constructed in isolated areas remote from large centers of population. It is probably true that the overall operational costs of such plants would be somewhat greater because the power produced would have to be transmitted larger distances. However, it has been stated by many authorities that nuclear power can be expected to be competitive first in remote areas where conventional fuels are not readily available. Therefore, requiring a reasonable degree of isolation from large concentrations of prospective disaster victims would give actual operational experience in those areas where these plants are expected to have their earliest break-even point, as well as minimize the hazard to the public.

The overall operational costs of isolated plants may be somewhat greater if the power produced has to be transmitted larger distances to reach the point of consumption in large metropolitan centers. However, these plants cannot be justified on the basis of economics, because everyone expects that the power which they produce will cost more than power from conventional fuels. The only justification for the construction of these plants is found, not on the basis of economics, but on the basis of research. Since they are research projects, the requirement of isolation would in effect be a protection to the public in the research and development program. The fact that this protection might cost an additional sum of money should not deprive the public of this protection, inasmuch as it in no way detracts from the progress which might be attained in the atomic-energy art.

We doubt very seriously that the Government has any moral right to subject its citizens to all the risks attendant upon an atomic disaster, especially where those risks can be minimized by the payment of a reasonable price for additional protection. If and when the atomic energy art advances to the point where there can be some reasonable estimate of the public risk involved, then a decision can be made to to whether or not such plants are justified in close proximity of large centers of population. As stated in the Columbia University report, Financial Protection Against Atomic Hazards, published in March 1956:

> Should atomic accidents happen at such frequency that they become a real threat to the economy, we can then reexamine the question of full protection. Indeed, we can then reexamine whether the rapid development of peaceful atomic energy is worth the cost.

Under date of February 11, 1956, there appeared in the publication Human Events an article entitled "Nuclear Nonsense," which was written by David Shea Teeple, a former assistant to AEC Chairman Lewis L. Strauss. We believe Mr. Teeple's views on the propriety of isolation of experimental plants warrant repetition here. He said:

> Generally, when we change techniques of manufacturing, it is because we achieve a better or a cheaper product. Are either of these yardsticks applicable to the development of atomic power? The product is going to be the same—the hazards are going to be increased and the cost is going to remain constant or, if anything, increase.
>
> Why then the hysterical rush to develop this program? What is wrong with pursuing the problem in an orderly scientific fashion, in isolated sites already established for that purpose?
>
> Some of us have spent many an hour inside reactor buildings and know that every conceivable safety device is employed. The possibility of disaster is remote but nevertheless ever-present. The old saying still applies to the effect that nothing can be made so "fool proof" that a big enough fool can't disrupt it.

Industry normally includes in the competitive cost of production the expense of the risk involved in the particular type of enterprise. The public liability risk is relatively small in most industries. However, where the risk is great the premium for liability insurance is substantial. For example, the explosives industry pays a high premium for insurance against public liability in its manufacturing, handling, and transportation.

It is obvious that no actuarially sound rate can be established for atomic-disaster insurance over and above the limited amount available from private enterprise until such unfortunate time when experience will have provided an indication of the total cost of such disasters. In addition, the reactors being planned under the present program could not bear the cost of such insurance even if it could be determined on a precise basis, because they are expected to be noncompetitive even without the insurance cost. Under these circumstances it seems reasonable for the Government to assume, for the limited number and type of experimental reactors already discussed, the additional subsidy of the undetermined cost of the indemnity under discussion.

Notwithstanding these considerations, we should not entirely lose sight of the healthy principle already endorsed by the AEC that "financial assistance to private power reactors should be in a form which can clearly be identified and measured." Unless the amount of Government subsidies involved in the production of atomic power is measured and made public, the public will never be in a position to evaluate the economic desirability of a Government-financed atomic-power-development program. The legislation now under consideration should provide machinery to establish, with the most accuracy possible under the circumstances, the reasonable cost of the free indemnity being furnished by the Government. This legislation should also direct that all official calculations of comparable costs of electric generation include such reasonable cost of the indemnity subsidy for atomic powerplants.

We feel there are a large number of vital problems with respect to which the Government should secure the greatest possible amount of information before enacting legislation dealing with the atomic disaster situation. Before such legislation is enacted, it should first be determined whether the Government will merely indemnify the nu-

clear reactor operator against his liabilities to the public arising out of an atomic disaster.

As an alternative, will the Government attempt to afford financial compensation to the public for all of the actual damages which may result from such a disaster, including those injuries for which recovery cannot be had under existing law because they cannot be proved to be the direct result of the particular disaster in question, or for other reasons with which existing law is unable to cope. We agree with the Columbia University report, previously referred to, which states that—

in discussions of the problem to date, the vulnerable position of the public has not been sufficiently articulated.

Whatever legislation is enacted should attempt to define the injuries and the damages for which compensation will be paid by the Federal Government. Existing law and legal concepts may be sufficient to determine the damages arising as a direct and immediate result of any blast which might occur in an atomic disaster. However, new concepts, based upon yet-to-be-developed information and techniques, will be required to determine the extent of actual injuries arising out of the escape of radioactive poisons in an atomic disaster.

Under date of April 16, 1956, the chairman of this committee, the Senator from New Mexico, Mr. Anderson, delivered an address before the northeastern regional meeting of the American Bar Association. In that address he listed in detail a number of the perplexing problems which should be considered by the Congress in connection with this matter, if proper consideration is to be given to the public interest. We commend that speech to the attention of this committee, and point out that the questions therein raised are not mere legal brain twisters—they are questions which must be solved if the public is to be relieved of any substantial part of the financial burden of atomic power disaster. For example, if the Government decides to grant only indemnity against liability under existing law, how can the victims of an atomic disaster prove negligence in the operation of a reactor? How can damage from radiation be proved, in the face of the statute of limitations? Will the cost of evacuation and decontamination of a contaminated area be recoverable? If radiation causes damage to the genes in a parent, to whom does the right of action belong—the parent or the deformed child?

We do not have the answers to these questions and the many equally difficult questions which can be raised in connection with legislation to reimburse the public for injuries and damages caused by nuclear reactors. They should be answered in a manner which will furnish adequate financial protection to the general public before the Government proceeds with the construction or subsidization of atomic power reactors near large centers of population.

Representative PRICE. Thank you very much, Mr. Pickett, for a very fine statement. I want to commend you for the consideration and thought that you put into this statement. I might say that as a member of this committee I think I can speak for all of the other members of the committee, that at some time or other in our consideration of this project we have thought of almost everything that you have mentioned in here. There is considerable to be thought of and many problems to be adjusted in this program.

I want to commend you for the opening section of your statement, stating the position of your organization. I think it takes a very fair and reasonable position in regard to the overall program.

Of immediate concern to the committee, in the matter of the Government indemnity, is the protection of the public. We have already agreed on a reactor-development program with private industry participating and more or less carrying the ball.

The thing that concerns us is whether the program is going to get on, since it has been decided to be of national interest, and whether the obstacles appear to be the matter of public liability and Government indemnity. This committee is trying to ascertain just what national policy to adopt. I can assure you that almost every part that you have raised in this has to be considered by the committee and certainly will be considered by the committee before a final consideration or final action is made on the proposed legislation.

In your statement on page 4 you say, in your second point that the Government indemnity against atomic disaster and all other subsidies of atomic development should not be available to nuclear powerplants which may be constructed after atomic energy is considered to have passed the experimental stage and reached the competitive stage.

The thing that we are thinking of is public protection in the program that we are trying to arrive at through these hearings. What, then, would happen to the public protection if we suddenly withdrew? You understand that we are placing a limit on this in suggested legislation.

Mr. PICKETT. We take the position that in the Government's discharge of its responsibility to the research and development phases of nuclear power reactors it should subsidize it appropriately up to the point where it is established to be competitive. Beyond that we do not think that the Government ought to be subsidizing private enterprise or anything else.

Representative PRICE. I think that that is the general feeling of most people on this subject.

Mr. PICKETT. If you are going to stop the subsidization at some point, why do you not stop it all at the same point? We are not experts in the matter, of course, but I think it is reasonable to assume that by the time the program has been developed to be competitive with conventional means of generation of power, there will have been some evidence of sufficient experience that private enterprise can also take over the indemnity features, too. We do not pretend to be experts in matters of that kind.

Representative PRICE. I think that is recognized by the committee, because almost everyone has set a time limit on the matter of Government indemnity. I think that you are right in that.

Mr. PICKETT. Then we suggest an additional limitation by incorporating within the language of the bill that may be reported out some limitation to the effect suggested here.

Representative PRICE. You have raised many interesting points in here. I can assure you, and I think you know the membership of the committee well enough to know, that almost every one of these points will be given consideration. As a matter of fact, most of these points have at times been discussed, I think every one of them has been discussed.

Mr. PICKETT. We regret that we have not been able to enlighten the committee any further than its own thinking has led it into enlightenment.

Representative PRICE. I say that you have, because it indicates that you have been following the program very well and you are very familiar with it. You would have to be a member of the committee almost yourself to be able to raise all of these points.

Mr. PICKETT. We are happy that we have not raised any new and perplexing problems for your consideration.

Representative PRICE. It is a mighty fine statement, and we are glad to have it this morning.

Mr. PICKETT. Thank you, Mr. Chairman.

Representative PRICE. The next witness will be Mr. William Webster, president of the Yankee Atomic Electric Co.

STATEMENT OF WILLIAM WEBSTER, PRESIDENT OF YANKEE ATOMIC ELECTRIC CO.

Mr. WEBSTER. My name is William Webster, 441 Stuart Street, Boston, Mass. I am president of Yankee Atomic Electric Co., which proposes to construct a demonstration nuclear powerplant in western Massachusetts. The plant will use a pressurized water reactor and will have a net electrical output of approximately 134,000 kilowatts. The power output will be sold to 12 New England utilities, which are Yankee's sole stockholders and are responsible for the supply of approximately 90 percent of the electrical needs of the New England area.

This program was the basis of Yankee's proposal under the power demonstration reactor program. The Atomic Energy Commission has indicated its willingness to assist in the research and development phase of the project, and a formal contract is now being negotiated with members of the Commission's staff.

Our schedule calls for the commencement of major construction in the spring of 1957, a little less than a year from now. We estimate that we will need about 3 years for construction, and hope to have the plant in operation in 1960. We still have very substantial technical problems ahead of us which we hope, with reasonably good breaks, can be resolved in time to keep pace with our construction schedule.

The insurance problem has been a matter of major concern to us from the outset. Thus far, we have gone ahead with our plans without waiting for a complete solution of this problem, in the confidence that it could and would be solved by the time we were ready to commence major construction.

The insurance problem is, of course, a specialized aspect of the safety problem. This has been a matter of foremost importance throughout our planning. In selecting a pressurized-water reactor we have adopted what we regard as an essentially safe design. We have selected a site which tends further to reduce any risk that might be involved. All appropriate safety measures will be incorporated in the plant design as our work progresses. So far as is humanly possible, we intend to have a plant that will minimize the need for extensive liability insurance.

We have been gratified by the response of the insurance community to the needs of the new atomic industry, and by the very large amount

of private insurance capacity that has been marshaled to provide third-party protection. The $65 million capacity presently available is larger by far than anything that has heretofore been offered, and will be more than adequate for any normal insurance needs. We have reluctantly concluded, however, that to take care of the minimum residual risk involved, some form of additional coverage is necessary, not merely for us to go ahead, but also to meet the needs of senior investors to whom we must look for the additional financing that is vital to our program.

The proposal which Senator Anderson outlined in his letter of invitation seems to us an appropriate means of providing this additional protection. Speaking for ourselves, we feel that we can go forward with our project under this proposal. While obviously we cannot speak with assurance as to the reaction of the financial community to whom we must look for senior financing, we have every confidence that they, too, will find this proposal an acceptable solution of the insurance problem.

If governmental indemnity is available to cover this remote possibility of a major disaster, our principal remaining insurance problem is one of cost. We recognize we must be prepared to spend more for insurance for a demonstration nuclear plant than would be necessary for a conventional powerplant of equivalent size, particularly in the early years before there has been an accumulation of safety experience with civilian reactors. However, insurance costs will have a significant impact on our operating results and must be considered in our planning. We have been reassured by the realistic approach that has thus far been adopted by spokesmen of the private insurance syndicates, and their realization that premiums must not be so high as to price this coverage out of the market. We hope that more specific information as to the cost of private insurance will be available in the near future.

Senator Anderson's letter of invitation requested a brief comment as to what factors other than the insurance problem are impeding progress at the present time. We feel that solution of the insurance problem will eliminate the only absolute roadblock to Yankee's program. This does not mean that we will have no further problems, for we will—ranging all the way from substantial technical problems to financing details and problems of accommodating our program to the various regulatory standards, both State and Federal, which apply to any utility company venture. However, we are confident that these problems, unlike the insurance problem, can be solved without the necessity of further legislation.

Chairman ANDERSON. Mr. Webster, you have known of the fact that some of the companies have felt that there might need to be exemptions from the Public Utility Holding Company Act. Without trying to pass on the justice or lack of justice of their proposal, is this an obstacle to your operation?

Mr. WEBSTER. We do not have this problem, sir, because the Securities and Exchange Commission has already passed on our case, and we have received all of the approvals and exemptions that are necessary for us to go ahead.

Chairman ANDERSON. And you find that you can do that without the necessity of special legislation?

Mr. WEBSTER. That is right, sir.

Chairman ANDERSON. Is this question of the income tax situation and the contributions to research being chargeable to expense any problem to you?

Mr. WEBSTER. No, sir; we are not in trouble with that.

Chairman ANDERSON. Do you anticipate it will be any problem?

Mr. WEBSTER. We do not.

Representative PRICE. I have no questions.

Chairman ANDERSON. Thank you very much.

Mr. Oakes, we welcome you as we have others who are making a serious effort to help in the construction of these powerplants by private companies so that a very substantial amount of nuclear power may be made available by 1960 or thereafter. We are happy to have the testimony of your company as well.

STATEMENT OF CHARLES E. OAKES, PRESIDENT OF THE PENNSYLVANIA POWER & LIGHT CO.

Mr. OAKES. Thank you very much.

My name is Charles E. Oakes. I am president of Pennsylvania Power & Light Co., a company which furnishes electric service to more than 680,000 customers in an area of some 10,000 square miles in central eastern Pennsylvania. I appreciate the opportunity of appearing here today in connection with the committee's consideration of the important questions of insurance affecting the atomic-energy industry.

The present direct interest of Pennsylvania Power & Light Co. in atomic energy matters stems from the joint program now underway with the Westinghouse Electric Corp. to develop a homogeneous-type reactor as the heat source for a powerplant of approximately 150,000 kilowatt capacity. This program has been underway for about 1 year and we believe that good progress is being made. Because development of a homogeneous reactor involves a new field and considerable new technology, substantial research work is required. A staff of scientists and engineers has been set up and provided with facilities to do this necessary work. We now anticipate that by mid-1958 we will be able to proceed with the detailed design and construction, looking to an inservice date of 1962.

We do wish to point out that we have gone right ahead with our program without regard to the insurance problem which is the subject of these hearings. This has been done on the assumption that the problem would be dealt with and satisfactorily resolved.

We believe it to be very desirable that prompt action be taken to bring about the hoped-for solution.

As we understand the proposal outlined in Senator Anderson's open letter of April 25, 1956, we consider that effectuation of this proposal through properly drafted legislation would provide a reasonable solution of the insurance problem.

We do point out that the limitations of liability proposals are an important feature of the proposal in our opinion.

We do, of course, have in mind that the insurance rates for the coverage to be afforded by the insurance industry must be on a reasonable basis. We consider that the same is true for the minimum charge for indemnity coverage referred to in Senator Anderson's

letter. However, we expect that through these hearings assurance will be forthcoming that such rates and charges will be reasonable and appropriate to the needs of the situation.

Chairman ANDERSON. May I stop you there, Mr. Oakes?

Your reactor is based more closely on some types that have been worked on at Oak Ridge; is it not? You have some very serious problems still to work out.

Mr. OAKES. That is true.

Chairman ANDERSON. That is before you start construction.

Mr. OAKES. Yes, sir.

Chairman ANDERSON. Therefore, the date of 1962 is probably a reasonable and realistic date.

Mr. OAKES. I would think so. We have had very serious studies made, and that date is the date we have selected if we can work out all of our research and development problems. We think we can get a reactor in service by that date.

Chairman ANDERSON. Therefore, the insurance problem is not quite as close to you as it is to the Commonwealth Edison that hopes to have its operation going by 1960?

Mr. OAKES. That is true.

Chairman ANDERSON. You have a couple more years beyond that.

Mr. OAKES. That is correct; yes, sir.

Representative PRICE. If your reactor is successful, you will probably contribute more to the advancement of the art than any of the others; will you not?

Mr. OAKES. We think we have selected the type of reactor that will be competitive as nearly as any other type. Certainly, it is one of the different types than is now under investigation. That is one other reason we selected it.

Chairman ANDERSON. What I am trying to ask you is this: Knowing how this committee is interested in this problem, and knowing that it is moving ahead and knowing that your completion date is still 6 years away, you would not be delayed much by the insurance problem as it now stands?

Mr. OAKES. Well, there are insurance problems with reference to research matters that will involve liability and may involve accident. How serious it will be and to what extent I do not have any real measure. But they are present. They are not, of course, present to the degree that they will be on a large power reactor. That is true.

Chairman ANDERSON. You are not being held back at the present time?

Mr. OAKES. Not in the slightest.

Chairman ANDERSON. But we are hoping to deal with the problem and have it solved in a reasonably short time so that it will be of real benefit to you. When you plan your reactor, which is a rather, shall I say, advanced type instead of radical design, you naturally will be discussing with the Atomic Energy Commission and its experts the safety factors and the hazards that may be within it.

Mr. OAKES. That is true; we will.

Chairman ANDERSON. And you will do everything as a prudent businessman would to make sure that there is no undue hazard to the public in that reactor?

Mr. OAKES. Yes, sir; we certainly would do that. We would examine it from that standpoint. We would have that consideration.

Chairman ANDERSON. I ask that question only because there are people who are still worried that some reactors may run away and blow up in this country. We are trying to persuade them by every witness that comes before us that a great deal of care and thought has gone into the safety factors long before you start to construct.

Mr. OAKES. Yes, sir. I can say with absolute assurance that the question of safety will be very, very carefully investigated, and any designs that are made will have that in mind. A primary feature of design will be to cover the safety features.

Chairman ANDERSON. I think the next two paragraphs of your statement cover that, but I want to be sure as you went through it that if you felt like giving any extra words to the public you would go ahead and do so.

Mr. OAKES. Thank you.

We also believe it to be important that there be no undue public apprehension as to the nature of the risk which exists by reason of the operation of power reactors. Substantial risks are present in every industrial complex. The experience at Texas City is an example of the unexpected which can happen.

Certainly Pennsylvania Power & Light Co. will not build any power reactor which is considered to involve any unreasonable risk of danger to the public. And, as we all know, the very able technical staff of the Atomic Energy Commission and the Reactor Safeguards Committee have the responsibility and the power to prevent the construction or operation of any installation which does not meet strict safety requirements.

Nonetheless, there is what has been called the remote possibility of extreme hazard. Because of this, it is certainly wise to enact legislation which will protect the public in the event this remote possibility should occur. Suitable protection for both properly licensed reactor operators, manufacturers of component parts, and other interested parties is, we think, an appropirate and necessary feature of a complete program of protection.

If this insurance matter is now satisfactorily resolved, the one legal impediment which is of concern to us will have been removed. We do not have in mind that any other implementing legislation is or will be necessary.

Chairman ANDERSON. You heard the question I directed to Mr. Webster about the Public Holding Company Act and the income-tax provisions. Are those problems to your company?

Mr. OAKES. No, sir; they are not problems to us.

Chairman ANDERSON. Thank you very much. That is a very fine and a concise and a fair statement.

We will resume at 2 o'clock. In advance, I express my regrets that I will be on the floor of the Senate probably.

Thank you very much.

(Whereupon the committee recessed at 11:25 a. m.)

AFTERNOON SESSION

Representative PRICE (presiding). The committee will be in order. The first witness this afternoon in the continuation of the hearings

to hear testimony on proposed legislation for a governmental indemnity or insurance program to supplement private insurance covering reactor hazards to the public will be Mr. John N. Keen, the manager of the Wolverine Electric Cooperative of Big Rapids, Mich.

Mr. Keen, would you come around, please? Do you have a prepared statement?

STATEMENT OF JOHN N. KEEN, MANAGER, WOLVERINE ELECTRIC COOPERATIVE, BIG RAPIDS, MICH.

Mr. KEEN. Yes, I do, Mr. Chairman. First, I wish to thank you for the opportunity to present my views, and also the views of the organization which I represent, the Wolverine Electric Cooperative of Big Rapids, Mich., on the subject of third-party liability insurance for the reactor industry.

Our cooperative is an REA-financed generation and transmission utility supplying electric energy to approximately 20,000 farms and rural residences throughout central western Michigan through its three member distribution cooperatives.

On February 1, 1956, we submitted a proposal to the Atomic Energy Commission for the construction of a small—5,000 to 10,000 kilowatt—nuclear powerplant under the Commission's power demonstration reactor program. This proposal has been accepted by the Commission for negotiation and we are currently attempting to resolve for contract purposes the many problems surrounding a project of this kind. We are presenting our views, therefore, as a potential representative of the operating phase of the reactor industry.

Initially in developing the application of atomic energy to peaceful uses, an extensive research and development program was carried on solely as a governmental function and full liability responsibility rested with the Government. More recently, as a direct result of the Atomic Energy Act of 1954, this program—still experimental and developmental in character—has been expanded to benefit more fully from the technical know-how of American industry. Industry, in turn, has welcomed this opportunity and is responding by expending untold millions of dollars in research, development, and design.

To date, the recator industry has not been confronted with undue libility risks since privately owned reactor facilities are not yet in operation which might pose large-scale hazards beyond the scope of reasonable and economical insurability. However, the time is rapidly approaching when many projects will stagnate unless the problem of third-party liability is resolved.

Reactor development is, and may continue to be, highly experimental for years to come, and only time can tell whether or not a reactor incident of catastrophic proportions will ever occur. It is certain that a series of such incidents could not be tolerated.

In view of the difficulty of evaluating the possibility and cost of insuring against this hazard, it does not seem reasonable to require that segment of the American industrial complex directly concerned with the development, manufacture, servicing, and operation of nuclear reactors in the present stage of the art to bear an economically burdensome cost of insuring against catastrophic radiation damages when the long-range benefits of the current developmental program will accrue to the public in general.

It is apparent that adequate protection to the public must be provided for each and every power reactor development undertaking. To furnish this protection on an equitable basis, consideration must be given to the amount of coverage that each liable party can afford to carry without jeopardizing the program through excessive insurance charges because of a need to insure under high liability limits which do not take into account the insured's ability to pay.

It is obvious that groups with limited financial resources which are assisting in the development program, such as universities and colleges, municipalities and REA cooperatives, and small industries could not afford to insure against any conceivable catastrophe.

We do not profess to understand the technical, financial, and legal problems of liability insurance coverage. However, we do believe that the following broad concepts should be considered in resolving this problem:

1. Insurance against liability for damage to persons or property resulting from radiation exposure should be made available to industry by the underwriters up to the limits of coverage now available against other classes of liability claims, preferably as an endorsement to existing policy forms and at reasonable cost.

2. The various components of the reactor industry should be expected to carry liability coverage normal to their industry category and to the extent that any prudent businessman would so be insured. Radiation damage coverage should be a part of such insurance.

3. Minimum amounts of liability for claims resulting from radiation damage should be established for the various components of the reactor industry. These minimum amounts should, among other things, reflect the insured's ability to pay, possibly by being related to total assets, total sales, or one or more other measurable factors.

4. Beyond the limits of coverage previously suggested, the Government should assume full responsibility for the settlement of claims resulting from a catastrophic reactor incident.

We believe that the application of these principles would be desirable for the following reasons:

1. The public would be fully protected.

2. All normal small claims for damages would be handled through existing insurance channels without Government interference.

3. The reactor industry would not be penalized with excessive insurance costs by virtue of participating in a developmental program which is of benefit to the entire Nation.

4. Small reactor projects could proceed whereas the need to carry high-risk coverage at excessive cost might make them infeasible.

If the nuclear power program is to move forward, the roadblock of liability protection must be clearly lifted. Certainly during the developmental stage of this effort, which may conceivably last for many years, the Congress should not require the reactor industry to carry burdensome insurance to protect itself against claims resulting from a catastrophe.

Beyond this point, only time and experience will enable the insurer to propose costs and the insured to evaluate them for the purpose of determining whether or not he can afford the luxury or risk of operating in any particular branch of the nuclear field.

Representative PRICE. Mr. Keen, do you feel that there should be Government indemnity provided?

Mr. KEEN. I feel this way: That there should be full coverage to protect the general public from any catastrophe that might possibly arise.

Representative PRICE. Do you think that coverage should be guaranteed by the Government?

Mr. KEEN. It is my belief that that is the only way it can be fully covered at this time because we do not know how extensive that catastrophe might be and we feel that anything manmade the public should be protected from in a financial situation.

Representative PRICE. When you get to the matter of rates, your chief concern is that the rates be based on the operator's ability to pay. Is that the gist of your statement here?

Mr. KEEN. That is correct, Mr. Price.

Representative PRICE. For a smaller operation, particularly such as yours, is that right?

Mr. KEEN. We feel this way: That the universities, colleges, municipalities, and small utilities are just as important to this development program as the larger reactors are. The insurance companies have now a top figure of $65 million. That may be extended at some date, and if these small reactor operators were required to carry such insurance as that, it would undoubtedly make the complete project infeasible, and therefore, the small reactor development program could not go on.

Representative PRICE. You figure if the Government protection began after $65 million, that a project such as yours would be infeasible, and you would not be able to participate in the program; is that it?

Mr. KEEN. If you take the liability rates as applied to just conventional operations as we know them today, forgetting about the radiation exposure, and work them on up to possibly $65 million, that is, using the same formula, if you laid them out on a graph as they now apply up around $10 million, definitely the same rates that they use for insurance would make it prohibitive for the small reactor to carry on.

Representative PRICE. In other words, you feel that a case should be considered individually and the Commission would arrive at a definite pattern on how to deal with each specific project, rather than to set a figure of $65 million being available, and therefore, you would have insurers up to that point and then the Commission take over from there?

You think that your project should be treated in an individual manner and a figure far less than that should be the guiding point?

Mr. KEEN. That is partially our thinking, Mr. Chairman, but not entirely. That is one consideration.

The other would be that there should be an evaluation made or consideration given to the size of the company involved, the size of the reactor involved, as to where the Government starts taking over the insurance liability and where the private insurance leaves off.

As an example, if a company were to construct, let's say, a 200,000-kilowatt reactor, that is, 200,000 kilowatts of electric power output, that would be maybe 5 or 10 percent of that company's total capacity.

Therefore, that company would be generating up in the hundreds of thousands and up in the millions of kilowatt-hours. If a small reactor that could only produce one-tenth of that or one-twentieth of

that had to carry the same insurance burden as the 200,000-kilowatt reactor, that would be a hardship on the small reactor.

In fact, it would be undoubtedly prohibitive to carry that. It would not be a fair ratio between the two.

Representative PRICE. What you are actually saying is you don't think that you should get into this situation where, because private insurance companies were in a position or agreed to insure facilities up to the point of $65 million, you should be compelled to go to that limit before you would be covered by Government indemnity; is that it?

Mr. KEEN. That is right. That would be unfair to the small reactor builders, and we feel that the small reactors play a very vital and important part in this development program.

Representative PRICE. Have you looked at any of the legislation that has been proposed so far on this subject?

Mr. KEEN. I have not seen any proposed legislation as such, but I have seen some newspaper articles and some news releases on some of it.

As far as the pertinent facts as to what you are thinking, I am not entirely aware. However, we wanted to make a point, and that was, we would like to have you consider the difference in the size, the difference in the character of the reactors, so that proper evaluation could take place in order that the small reactor industry would not be still bottlenecked by the insurance problem.

Representative PRICE. Specifically, on your project, a 5,000- or 10,000-kilowatt project, how high do you think a project of that sort could go in the matter of providing private insurance?

Mr. KEEN. Mr. Price, we in the generation of electrical power analyze the cost on a kilowatt-hour basis; in other words, what our system capacity is, and our costs are constantly evaluated on that basis.

What we are talking about here is a small reactor and a complete system which by the time the reactor is in operation will be producing about 100 million kilowatt-hours per hour. At that rate, if we took, say, a fraction of a mill and applied it toward insurance, the normal thinking of the industry today would be this:

That we could perhaps spend in dollar volume—I am not talking about the amount of coverage we could buy for the dollar volume, because we have not seen a rate—compared to our present rates, we could probably buy $10,000 worth of insurance; that is, we would pay between $5,000 or $10,000 per year for the premium for that insurance.

We could afford to do that, which under the current rates would only buy perhaps $20 million or $30 million worth of liability coverage. We do not know what the rates will be for the reactor coverage, but assuming that they would be similar to the present rates, that would mean that we would still have a deficiency of $30 million or $35 million before we reached the $60 million or $65 million level for the Government to take over.

Representative PRICE. In your specific case, couldn't the AEC provide an indemnity under the current AEC Act in your negotiation of contracts?

Mr. KEEN. As far as we are concerned, not speaking for AEC, I believe that would be possible, but they would have to answer that on their side.

Representative PRICE. Would the contract be a simple way to handle your situation?

Mr. KEEN. We are in negotiation for contracts at the present time. The fact is a rough draft is now being drawn and we except to review that jointly in about 7 or 8 days.

The liability insurance at this time is not included in that contract because AEC believes at this time that it would take perhaps a special ruling on it before they could carry it in under this reactor program, but I am not an attorney.

Representative PRICE. Was it discussed in the negotiations?

Mr. KEEN. It has been discussed. The way our project is now, we have committed ourselves that we will go ahead with construction, but we will not go into operation with this reactor until satisfactory liability coverage has been made, because we do not want to jeopardize the general public in any possible way financially.

Representative PRICE. Thank you very much. It was a fine statement, and we are glad to have it.

Mr. KEEN. Thank you.

Representative PRICE. The next witness will be Mr. Donald Dunham, the director of the retirement, safety, and insurance department, National Rural Electric Cooperative Association.

Mr. Dunham?

STATEMENT OF DONALD H. DUNHAM, DIRECTOR, RETIREMENT, SAFETY, AND INSURANCE DEPARTMENT, NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION; ACCOMPANIED BY ROBERT KABAT, ADMINISTRATOR, NRECA ATOMIC ENERGY STUDY GROUP

Mr. DUNHAM. My name is Donald H. Dunham, and I am the director of the retirement, safety, and insurance department of the National Rural Electric Cooperative Association.

I have with me today the administrator of our own atomic-energy study group, Mr. Robert Kabat.

It is the responsibility of our department to assist our member rural electric systems in securing adequate insurance protection at the lowest possible cost.

I appreciate the opportunity afforded by the Joint Committee to appear before you to discuss the atomic reactor insurance problems which we are encountering.

Our interest in atomic power, because of the high power cost of some of our systems, is extremely great. Our loads are doubling every 5 years, thus creating a lack of power supply. Our atomic-energy study group received final approval from the AEC on March 18, 1955.

There have been several meetings of the full study group with officials of the Nuclear Power Branch of the Army Corps of Engineers, the AEC and private industry who discussed the work they are doing in the development of power reactors.

Members of the group also made visits to various AEC installations such as Oak Ridge, Argonne, Arco, and Shippingport, Pa. We feel that the activities of the study group have been responsible for bringing to the attention of the rural electric systems some of the new developments of the rapidly changing field and also have been responsible to a great extent for the proposals which were received from

the rural electric systems by the AEC under their small-scale demonstration power reactor program.

The three current proposals submitted by rural electric cooperatives under AEC's small-scale program are evidence that the rural electric systems are tremendously interested in atomic power. These three cooperatives are:

1. Rural Cooperative Power Association, a federated generation and transmission cooperative at Elk River, Minn., which submitted a proposal for a 22,000 kilowatt boiling water reactor;
2. The Wolverine Electric Cooperative, a federated generation and transmission cooperative of Big Rapids, Mich., which submitted a proposal for a 10,000-kilowatt aqueous homogenous reactor; and
3. Chugach Electric Association, Inc., a distribution cooperative of Anchorage, Alaska, which submitted a proposal for a 10,000-kilowatt sodium-cooled, heavy water moderated reactor.

These rural electric cooperatives are in some of our highest cost power areas. These high power costs, of course, account in large part for the keen interest of our systems in atomic power.

We continue to disagree in general with the conclusions reached by the McKinney panel in the section entitled "Hazards, Protection and Insurance," contained in pages 12 and 13 of its report.

We disagree because we believe that the Government must assume some of the risk involved in the operation of atomic power reactors, and must do it now.

We also object to the present bill, H. R. 9802, introduced by Representative Cole, dealing with the insurance of reactors. We realize that this bill was introduced only as a starting point, and was not to be considered as the final legislative proposal on the matter.

We believe that to limit the liability, as outlined in the Cole bill, to twice the original capital cost of the reactor and that if damage exceeds that amount to require the licensee to go into the appropriate United States district court having jurisdiction of the licensee in bankruptcy for an order limiting the liability of the licensee, could not be accepted by any utility, especially if it required a further order apportioning the payments to be made. This would be an impossible situation for any utility constructing and operating an atomic reactor.

How could the utility explain to the general public that they regret the serious accident that took place, but they are sorry that their liability is limited to twice the capital cost of the reactor and that the maximum amount that they will receive in satisfaction of their claim will be limited by the amount required to be set aside for liability?

This certainly would present an impossible public-relations situation and we feel if the general public knew about this limitation, they would do everything they could to fight the placing of it in their area. For instance, the Elk River reactor will be located within 40 miles of Minneapolis.

Do you think the people of Minneapolis would want such a reactor located within their metropolitan area if they knew that any liability which may be incurred can only be satisfied up to twice the capital cost of the reactor?

We also believe that the bill introduced by Representative Price, H. R. 9701, is also generally unsatisfactory. This bill, in some respects, is an improvement upon the Cole bill, but its language is very general and may be difficult to interpret in the courts.

For instance, the bill says that the Government shall indemnify the utility for any public liability incurred provided that nongovernmental insurance against such liability has been procured in amounts deemed reasonably adequate by the Commission to provide against normal contingencies.

How does one determine what is reasonably adequate in this particular situation when there is no operating experience or no experience obtained in providing insurance for this type of risk? We think the amount of insurance which should be provided by the licensee and the part which should be provided by the Government should be clearly defined.

Representative PRICE. Of course, those things would be determined in advance, as you entered into an agreement with the Commission for a license.

They would be previously determined so the court would have those agreements to consider on any determination of liability. They wouldn't be left hanging after the project started. They would be determined before your project ever started.

Mr. DUNHAM. That would be true if you had experience.

Representative PRICE. Of course, your experience would entail your entering into the agreement. Once you entered into an agreement, the experience wouldn't be taken into consideration because the experience is necessary in setting the amount of insurance that they deem reasonable and they would deem that reasonable as they started the project and before anything could possibly have happened.

The experience is involved in the determination of what they believe to be a reasonable charge. Don't you agree with that?

Mr. DUNHAM. I would agree with that; yes.

Representative PRICE. I am not arguing with you. I am just throwing this out. It may be that you misunderstood the intent of the suggested legislation, but that is what it means.

It means you would settle these things in advance. You would make a reasonable finding before you entered into the project.

Mr. DUNHAM. That clarifies it both to Mr. Kabat and myself. However, initially it was our feeling that unless some evaluation could be made of the limit, you come up against not only a liability problem that could put you out of existence but a public relations problem that could ruin you.

Representative PRICE. We are all agreed on that, but the experience counts in making this agreement. However, once the agreement is reached, it is there for the court to consider and act on. The basis for your next step would be the Government indemnity.

Mr. KABAT. Is your idea then that, once the AEC makes a determination as to what is reasonable, the AEC would assume the liability for everything over and above that?

Representative PRICE. The AEC wouldn't, but they have the Government indemnity stepping into the picture. I say the experience is necessary in entering the original agreement. Once it is reached it is the basis upon which to proceed or on which to operate.

Mr. DUNHAM. As I understand it then, your reasonable amount would not necessarily be the top limit, but would only be the limit beyond which then the Government would step in?

Mr. NORRIS. The limit that would be reasonable would be the limit that would be set by the Atomic Energy Commission as the amount of insurance that would be required to be obtained by the licensee as a condition of license, and immediately beyond that the Government indemnity would take over, and whatever other provisions there would be in the statute.

Mr. DUNHAM. That clarifies it very much. Shall I continue, sir?

Representative PRICE. Yes.

Mr. DUNHAM. We certainly agree with the facts and information set forth in the open letter of April 26 over the signature of Senator Clinton P. Anderson, chairman of this committee. From the information we have, it is also our determination that a Government indemnity or insurance program must be established to supplement insurance covering reactor hazards to the public. We feel it must do so, at least until the operation of such reactors is more proven than at the present time. With Mr. Kabat's and my change in perspective in our previous discussion I think we are both agreeing along the same lines.

Representative PRICE. Yes. I think at the outset of your statement you didn't understand that we intended that, as I say here, the amount of insurance would be clearly defined before you start.

Mr. DUNHAM. Developing an insurance program for power reactors can't be delayed, because with approval of Rural Cooperative Power Association's proposal, and that of Wolverine Electric Cooperative, we—incidentally Mr. Keen just testified—and the systems must now be in a position to ascertain their insurance costs and assumptions of liability.

Because of the financial risk involved, the possible tremendous third-party liability which the insurance carriers fear may be possible, must be controlled and proper insurance or other protection secured. The part of the three rural electric systems' proposals requiring REA financing must be judged by REA on the basis of its present generation and transmission policy. Under this policy, REA must make sure that the project is feasible.

How can either the systems or REA possibly determine loan feasibility if they are unable to determine either the premium costs for the insurance or the magnitude of their responsibilities for the unusual third-party liability possibilities which they face?

We have been assured by our insurance carriers that the builders risk coverages necessary during the construction period of the plant and equipment and the fire and allied coverages can be handled up to normal limits.

The insurance capacity for the physical hazards as now applicable to more hazardous types of operations appears to be adequate to cover the atomic power reactor plants, the increased exposure of the latter appears to be beyond the capacity of the insurance industry.

Physical damage losses to machinery incidental to atomic plant installations can be handled in the same way that boiler and machinery coverage on extrahazardous machinery is now handled in other industries. However, radioactive contamination of machinery and equipment and the containing buildings resulting from a

power reactor failure presents new hazards requiring further protection than can presently be offered by the insurance industry.

We have already been given to understand that insurers of the public liability for Rural Cooperative Power Asociation will not cover any possible explosion or risk resulting from the use of the atomic reactor, simply because they have no way of knowing at this stage what the risks are.

We also have a like statement from the NRECA official insurance carriers in which they have endorsed a rider for Elk River excluding third-party coverage.

In a statement to us, Rural Cooperative Power Association indicates they have been given to understand their insurers of public liability will not cover any explosion or risk from the use of an atomic reactor and that their policy will be amended to so indicate.

In contacts with the insurance industry it appears that they are presently unable to determine the actual nature and scope of coverage that can be afforded.

We believe that insurance against loss of use frequently purchased in connection with boiler and machinery or other physical damage insurance presents a difficult insurance problem during the period of early experimental development of industrial atomic power for our systems.

Such insurance is, in effect, a guarantee of successful and continuous operation of the plant and it is believed that if any such protection is available it will be very limited in amount.

We are told by our insurance carriers that the workmen's compensation hazard for employees engaged in the operation of reactors and auxiliary equipment can be handled through their existing insurance facilities, but there is a possibility of an increased premium when a reactor goes into operation. It also appears that radiation damage directly attributable to employment can occur a number of years after the present limits for filing on a compensatory injury.

We are receiving questions as to what would be the utility's responsibility for delayed occupational effects which may be claimed after the time limits established in State statutes of limitation on compensation liability.

Another major catastrophe problem possibility in this connection is with respect to employees of other plants in which the air and water supply might become contaminated by fission products.

The possible public liability hazards resulting from damage to persons or property and arising from the construction, ownership, or operation of power reactors can be insured by existing insurance facilities up to the limits of liability normally available to more hazardous types of industrial enterprises, with the resulting premium or insurance cost increase.

We feel that from information received by Rural Cooperative Power Association and from our insurance carriers that they would be more than happy to assume the third-party liability up to the present limits now carried, which would be $300,000, and assume the present premiums they are now paying.

However, we feel that a means of sharing responsibility above those limits should be considered by the Government, with the Government assuming the liability over our present policy limits.

It is our feeling that there would be no objection on the part of the rural electric systems to make minimum payments for the excess coverage, especially in view of your comment—this is in reference to Chairman Anderson's comment—that the proceeds would be available to encourage research and development of improved methods of reactor safety.

Our association has long recognized the need to improve the safety for our systems' employees wherever possible.

The most serious problem lies in the field of third-party liability insurance. This problem arises from the very high aggregate insurance claims which might arise in the event of a possible catastrophic accident.

Such claims may be made directly by the person suffering injury or loss, or they might arise as subrogation actions on the part of insurers called upon to pay the loss in the first instance. Claims for property loss or decontamination paid by other property insurers or workmen's compensation losses arising from injuries to other employees in neighboring plants illustrate the subrogation problem and either might be of catastrophic proportions.

If such catastrophic limits are not assumed through cooperation by the Government, projects may become infeasible.

We certainly hope that this committee can develop the factual and policy basis for recommendation of legislation on this problem. We believe that it is in the national interest as well as in the rural interest to encourage the rapid development of an atomic power industry in this country. We are anxious that atomic energy development move forward as rapidly as possible.

Representative PRICE. In your statement you have made comment on the bill introduced by Mr. Cole, and also the bill introduced by myself.

I just wondered, with the clarification, have your views on the Price bill in any way been changed?

Mr. DUNHAM. Very definitely, sir. In fact, I think that I have already indicated in the record that I did feel that, with that clarification, it put an entirely different complexion as to what the top limits were.

We were thinking that the top limit would be the reasonable amount, and not that the reasonable amount would be a stopping point for liability, the Government to assume our catastrophic limits.

Representative PRICE. Would you have any comments to make on the general kind of legislative proposals as contained in Senator Anderson's letter to you and to other groups?

Mr. DUNHAM. Yes.

Representative PRICE. Do you have a copy of Senator Anderson's letter?

Mr. DUNHAM. No; I don't; not here with me.

Representative PRICE. If you would like, you may have this copy. There are several legislative proposals suggested in that letter, and I wonder if you have had an opportunity to study them and form any opinion, or if you care to make any expression in regard to that?

Mr. DUNHAM. As indicated already, we agree with that, generally speaking. However, Senator Anderson mentioned a ceiling of $500 million to be placed on the Government indemnity. My comment on that is that I feel that the $500 million in all probability should

cover most contingencies, but thinking not only in terms of rural cooperatives, if a utility were close to a large city, should there be a limit to responsibility?

In fact, Senator Anderson in No. 1 referred to special legislation on that.

Mr. KABAT. That is for anything over the $500 million if that becomes necessary.

Representative PRICE. Have you had an opportunity to see the legislative proposal of the AEC?

Mr. KABAT. No; we have not seen this at all. Is that available?

Representative PRICE. It was introduced the first day of the hearings here. I don't know if there are any printed copies available yet. I understand Representative Cole introduced it subsequently as a bill and it may be available. It would have been introduced in the House in the last 3 days.

Mr. KABAT. Would it be possible for us to examine this proposal of Representative Cole and then comment on it at a later date?

Representative PRICE. Yes.

Mr. DUNHAM. We would certainly be happy to do that.

On the summary of the proposals outlined here, I have already made my comments on No. 1. On No. 2, the liability of reactor operators and equipment manufacturers to be limited to their private insurance coverage, together with the sums made available by the Government for the third-party claims under the indemnity arrangements, we certainly agree with that.

As to the Government making a minimum charge per year per reactor for its indemnity coverage, with the proceeds to be devoted to AEC's research and development program of atomic safety, I have already indicated in my statement that we certainly agree with that.

Representative PRICE. On page 8 of your statement, Mr. Dunham, the last paragraph, the figure you put in there is not a final limitation on how high you think these smaller projects should go in assuming liability unto themselves, is it?

Mr. DUNHAM. The reason I used the figure of $300,000 is that is the normal top limit of most of the rural electric cooperatives now.

Representative PRICE. However, you are not setting that as a top limit as to how high you think you should go?

Mr. DUNHAM. Oh, no, sir. That is just their existing normal top limits, and the one also recommended now by REA's Insurance Department.

Representative PRICE. Thank you very much, Mr. Dunham.

The committee appreciates your cooperation and your fine statement.

Mr. DUNHAM. We certainly thank you, sir, for the privilege of being with the committee.

Representative PRICE. The final session of the committee will be held in the caucus room of the Old House Office Building at 10 a. m. on Monday next.

The committee will stand adjourned.

(Whereupon, at 2:40 p. m., Friday, May 18, 1956, the committee adjourned, to reconvene at 10 a. m., Monday, May 21, 1956.)

GOVERNMENTAL INDEMNITY

MONDAY, MAY, 21, 1956

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The Joint Committee met at 10 a. m., pursuant to recess, in room P–63 of the Capitol, Senator Clinton P. Anderson (chairman of the Joint Committee) presiding.

Present: Senators Anderson (chairman), Jackson, and Gore.

Present also: James Ramey, executive director of the Joint Committee staff.

Chairman ANDERSON. The committee will be in order.

Before we conclude these hearings, I want to put in the record a letter from Atomics International, signed by Mr. C. Starr;

Another letter from AMF Atomics, Inc., signed by Walter Bedell Smith, president;

One from Walter Kidde Nuclear Laboratories, Inc., by W. E. Kelley, president;

A letter from Stanford Research Institute, by Mr. Thielemann;

One from Union Electric Co., of St. Louis, signed by Mr. McAfee;

One from Tennessee Valley Authority, signed by Mr. Vogel, the chairman of the Board;

One from the International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers, and Helpers, by Mr. MacGowan, who, I understand, was very helpful to our panel;

One from Sylvania Electric Products Inc., by Mr. W. E. Kingston, general manager of their atomic-energy division;

One from Metals and Controls Corp., by Carroll L. Wilson, president;

A telegram from Mr. John Jay Hopkins;

A letter from Combustion Engineering, Inc., by Mr. J. V. Santry, the chairman;

A letter from Armour Research Foundation of Illinois Institute of Technology, signed by Mr. H. A. Cudy, Director;

A letter from the Bendix Aviation Corp.;

Also an excerpt from the preliminary report on financial protection against atomic hazards, prepared as part of an independent research project conducted by legislative drafting research fund of Columbia University.

(The documents referred to follow:)

ATOMICS INTERNATIONAL,
May 9, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SENATOR ANDERSON: As manufacturers of nuclear reactors, our company is very interested in the hearings which the Joint Committee on Atomic

Energy is holding on the subject of appropriate insurance for the atomic-power industry. The resolution of this matter will have a significant influence on the development of atomic power in this country. We wish to assist the committee in any manner possible.

As your committee may be aware, our company has under negotiation with the Consumers Public Power District and the Atomic Energy Commission a contract in connection with a 75,000 kilowatt powerplant using the sodium graphite reactor. At the request of the Consumers Public Power District our technical staff sometime ago prepared a detailed analysis of the safety considerations associated with this reactor as they relate to the nature, probability, and extent of reactor damage. The Consumers Public Power District arranged for this information to be presented at a meeting of insurance underwriters held in Los Angeles on June 15, 1955.

We believe that the information developed for this meeting is germane to the area of your committee's interest as described in your letter of April 26. Our study, of course, was specifically made for the sodium graphite reactor type, and any conclusions are applicable only to this type. Because of the very speculative nature as to probability of various types of accidents our analysis only serves to establish the magnitude of the costs involved and cannot be used as a quantitative basis for insurance purposes.

The types of incidents which might lead to reactor failure may be separated into two groups. The first relates to those incidents which result in the malfunction of essential portions of the operating equipment. This would include the failure to function of control and safety devices and other mechanisms essential to the steady performance of the reactor. The second pertains to failures which arise out of the unknown technological conditions which are associated with full-scale reactor operation and which cause the breakdown of materials and structures in the reactor. This latter group would include failures due to chemical corrosion, metallurgical changes in materials, and other phenomena not subject to precise analytical consideration.

Insofar as the first type of failure is concerned, it is of interest to note that in our analysis of the sodium graphite reactor it appears that for those nuclear incidents which might arise out of the multiple malfunctions of reactor mechanisms, the total costs of repair and power loss are projected to be less than $2 million for the very worst incidents. Although the combinations of malfunctions which were considered were not intended to be all-inclusive, we nevertheless believe that they represent a comprehensive group of possibilities.

In considering incidents of the second type it is conceivable that major portions of the reactor structure might fail for chemical or metallurgical reasons associated with the special circumstances which arise in nuclear reactor operations. In the event of such a failure it might be necessary to completely disassemble the radioactive reactor core and to reinstall new structural elements. Under the worst possible circumstances, such a major repair may involve costs in the range of 5 to 10 millions of dollars. In contemplating the circumstances that might give rise to this type of equipment failure, it is evident that at the present time full scale nuclear powerplants must be considered experimental in nature and that as a result there are and will be for some time many technological unknowns concerning the behavior of large reactor systems. Under these circumstances it is still possible for crucial portions of the reactor to fail even with the best maintenance and operating procedures and in spite of the proper functioning of the mechanisms provided for the safety and control of the reactor. Although it is recognized that this type of failure does not have a very high probability, it could be the most costly contingency which faces the owner of a nuclear powerplant.

Your attention is invited to the fact that the above types of failures refer only to the physical structures and mechanical components of the reactor system. In the study which we performed for the Consumers Public Power District it was not possible for us to evaluate the extent of public liability associated with the sodium graphite reactor. This particular reactor is so designed as to maintain structural integrity under any of the nuclear incidents which we have considered as in any way feasible. For this reason the spread of radioactive materials to the public is considered by us to have an extremely low probability and is not susceptible to quantitative analysis.

If additional information on this subject would be of value to your committee, we would be pleased to supply whatever we can. Unfortunately, I will be in

Europe at the time of the hearings and therefore I am not able to take the opportunity to appear before the committee. I hope, however, that the above remarks may be of some assistance in your deliberations.

Sincerely yours,

C. STARR, *Vice President.*

AMF ATOMICS, INC.,
New York, N. Y., May 17, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy, Washington, D. C.

DEAR MR. CHAIRMAN: Thank you for your letter of April 26 in which you outline a proposal for atomic-energy insurance legislation to be discussed at public hearings in Washington.

In response to your request, I should like to take this opportunity to express a few thoughts regarding the importance that the atomic-equipment industry in general, and our company in particular, attaches to the current discussions on this subject.

Generally speaking, we have been encouraged by the progress report of the insurance-industry advisory-study group released by the Atomic Energy Commission in March. However, we still strongly feel that the early availability of adequate insurance coverage to manufacturers and owners of atomic installations is vital to the immediate public acceptance and growth of the atomic-energy industry.

Now that the technical feasibility of atomic-power generation has been demonstrated, major concern is being expressed by potential plant owners and operators regarding practical operating problems, or what may be termed "the nontechnical feasibility of atomic powerplant operation." In the forefront of these problems, I believe, is the question regarding availability of adequate third-party liability and property-damage insurance protection at a cost which represents a reasonable fraction of the annual cost of operation. In my opinion, this probably is singularly the most important hurdle facing private atomic energy industry today.

In order that the insurance problem may be resolved at the earliest possible date, I see no alternative but that some form of Government assistance will be necessary. On this basis, the proposal outline which you and your colleagues have developed appears reasonable, and we sincerely wish you every success in this most important effort.

In my opinion, there is no doubt that early and favorable resolution of the insurance problem will provide a strong stimulus to the growth of the atomic-power industry in our country.

Sincerely,

WALTER BEDELL SMITH, *President.*

WALTER KIDDE NUCLEAR LABORATORIES, INC.,
Garden City, N. Y., May 11, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SENATOR ANDERSON: The problem of public liability insurance in the atomic power industry is certainly pressing. I was delighted to receive your letter of April 26 and want to congratulate your committee on the able and thoroughgoing efforts being made to settle this question. I am in general agreement with the legislative proposal outlined in your letter.

We at Walter Kidde Nuclear Laboratories have been very active in the study of reactor hazards. As you know, the real danger lies in the release of radioactive materials. Under the worst circumstances, a very great amount of damage can be done. This is a new kind of hazard; nothing like it has existed before. And it is not a natural hazard, it is man-made. If we are to enjoy the benefits of atomic energy, there is no way to completely avoid the hazard.

The gist of the insurance problem can be boiled down to a few words. The probability of a catastrophe is small, nevertheless real. The damage can be great and public liability insurance must be provided. The extent of the liability is not known. Private insurors cannot accept unlimited liability for statutory and other reasons. Therefore, in my opinion, the Government might well provide indemnity above that available from the private insurance industry. In my opinion, this is the essence of the matter.

There are some specific items on which my comments may be helpful. Your legislative proposal refers specifically to reactor operators and equipment manufacturers. Some serious quantities of radioactive materials can be released under many circumstances—fuel reprocessing, waste disposal, transportation, irradiation, just to name a few. I, for one, am convinced that the proposed legislation should be broadened in scope to include other hazardous situations which might be almost as damaging as a reactor catastrophe.

Your legislative proposal provides for a Governmental indemnity over and above that provided by the private insurance industry at reasonable rates. Naturally, as you point out, it is of particular concern to know how much private insurance will be available at reasonable rates. This is a nasty problem because it is not at all clear how much insurance should be carried. To be specific, suppose our company wants to operate a research reactor. Is $1 million of public liability insurance enough? Should it be 5, 10, 50? Perhaps the amount could be related to the power level and scheduled burnout of the reactor, since these quantities determine the amount of radioactivity which could be released.

Your legislative proposal in its second part exempts reactor operators and equipment manufacturers from liability in excess of their total insurance coverage. There should be some incentive to obtain maximum private insurance coverage and there should be some encouragement to minimize hazards, beyond the normal incentives in everyday business. At the moment I have no good thoughts on this matter.

The third part of your proposal establishes a minimum charge per year per reactor for the Government's indemnity coverage. As I mentioned above, no cognizance is taken in the present proposal of hazards other than reactor hazards. I suggest omission of the reactor charge, since the difficulties of administration and of making equitable assessments against the diverse kinds of reactors and other facilities do not seem to warrant the charges initially.

I hope my remarks are of some use to you. As you see, we are in fundamental agreement on your legislative proposal. The staff and resources of the Walter Kidde Nuclear Laboratories are available whenever they can be of service to you. Do not hesitate to call upon us.

Sincerely yours,

W. E. KELLY, *President.*

STANFORD RESEARCH INSTITUTE,
Menlo Park, Calif., May 11, 1956.

HON. CLINTON P. ANDERSON,
Senator from New Mexico,
Senate Office Building, Washington, D. C.

DEAR SENATOR ANDERSON: Your letter of April 26 regarding legislation to provide insurance for possible reactor hazards in the atomic power program deserves a great deal of consideration, and I am pleased indeed to have the opportunity to submit my ideas on the subject.

First of all, I think the most important consideration is that private insurance interests should not be permitted to generate or develop high risk rates for commercial nuclear power installations. The promotion of this type of thinking will not only discourage the development of nuclear power for peacetime applications, but it is totally unwarranted. With all the safeguards that have been developed and will be employed for the nuclear powerplants, there is every reason to expect that they will prove to be safer than conventional high-pressure plants which are now in service. It follows that the insurance rate which the utility companies have to pay should be no higher, per kilowatt installed, than for a conventional combustion-type powerplant.

Of course, it must be realized that, until we have some operating experience behind us with nuclear powerplants, there is the hazard that something might happen that is totally unforeseen. Because of this, additional indemnity must be provided by the Government. The additional Government indemnity, suggested in item I, would appear reasonable and desirable.

Because of the fact that the first nuclear powerplants will be so heavily dependent on Government financing and AEC controls, it is my definite feeling that the Government should carry all of the insurance on these plants and that private insurance industry should not even be considered. I would propose that the Government insure the utility companies at the same rates that they

now pay on conventional powerplants. The Government would insure up to 1 million kilowatts of installed capacity for a period long enough to gain the operating experience that is necessary. The moneys received by the Government for this insurance would be used to build up a general nuclear power insurance fund.

As to probabilities of reactor accidents and extent of damage, it is likely indeed that operating experience will be needed before accurate evaluations can be made. This situation is very similar to the one that existed back in the 1930's when the first large mercury boilers were being installed. The Kearney plant of the Public Service Company of New Jersey, for instance, contained 650,000 pounds of mercury and there was the possibility of a failure that would allow 650,000 pounds of mercury vapor to go up the stacks and give everyone in the vicinity mercury poisoning. Leaks did develop, but devices were also developed to detect leaks and to condense mercury so that it did not escape, and there was never any serious damage to the community. This plant and others are still in operation and, if anything, their records are better than that of the steam stations—as far as safety is concerned. I do not know what the insurance rates are for the mercury stations, but the power companies that are operating them would, I am sure, be willing and able to supply them.

Above all, high insurance rates must not be allowed to stand in the way of developing nuclear power for peacetime use. If the private insurance companies insist on unreasonable rates, the Government will have to take over the whole responsibility. Certainly, the risks will be nothing like what will exist if and when the Air Force flies a nucler-powered bomber, with liquid fuels and liquid metals, over inhabited areas.

I agree with you wholeheartedly that the development of an atomic power industry in this country is important from the standpoint of the utilization and conservation of our natural resources. When we realize that 1 B–52 bomber consumes 64,000 pounds of petroleum fuel every hour that it flies, the handwriting is on the wall. But it goes further than that. During the last 20 years, we have put very little real wealth back into this country. Our natural resources are being depleted at an alarming rate. Atomic powerplants will be real wealth for future generations to use and prosper with. I don't see how we can expect future generations to prosper if they have a staggering debt to support and are without the natural resources and real wealth that they need to maintain a prosperity that is dependent on high rates of industrial production and technological development.

Very truly yours,

R. H. THIELEMANN,
Manager, Metallurgy Section.

UNION ELECTRIC CO.,
St. Louis, Mo., May 7, 1956

Hon. CLINTON P. ANDERSON,
Senate Office Building, Washington, D. C.

DEAR SENATOR: I was very much encouraged by the suggestions you made recently in an open letter to the mailing list on the subject of insurance to cover third-party liability in the event of an accident in a privately operated reactor.

I have some questions in mind concerning the handling of damages in excess of the $500 million ceiling by special legislation. This inferred to me that the special legislation might be designed to limit total damages to the established ceiling. I wonder whether such a procedure would be desirable and whether it would not raise rather serious legal questions.

If ultimate legislation denied full reimbursement, it would seem to put an unwarranted burden on the citizen who, by a mere happenstance of physical location, incurred the loss. This would be emphasized if there should ever be 2 disasters, 1 with total damages less than the ceiling and 1 in which they exceeded the amount.

I have not had an opportunity to do any research on the question, but if legislation of the kind I am talking about should be enacted, I think there should be a thorough consideration of whether it would be legally effective to protect a private operator. I realize that in cases where a right beyond that given by the common law is established, damages for its violation can be limited to a prescribed manner; e. g., establishment of the right to recover for death resulting from negligence. However, the principle there involved would not be applicable to the situation under discussion.

I view the insurance question as extremely important to our progress in developing economical nuclear plants and am more than pleased with the serious consideration you and the committee are giving to the subject. It is with these things in mind that I feel justified in taking the liberty of writing you.

Very truly yours,

J. W. MCAFEE, *President.*

TENNESSEE VALLEY AUTHORITY,
Knoxville, Tenn., May 16, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Senate Office Building, Washington, D. C.

DEAR SENATOR ANDERSON: This is in response to your open letter of April 26, addressed to us and other members of the atomic power industry and the insurance industry, concerning proposed legislation for a governmental indemnity or insurance program to supplement private insurance covering reactor hazards to the public.

The Tennessee Valley Authority has not had occasion to study in detail the problems involved in connection with such a program. We believe, however, that any insurance or indemnity coverage provided should be available to Government agencies as well as private companies which may operate reactors. We are also of the opinion that if such coverage is to be applicable only to liability over and above a specified minimum amount, it should be available whether the reactor operator obtains insurance or acts as self-insurer with respect to liability up to that amount.

We shall follow the progress of this proposed legislation with great interest and appreciate the opportunity to comment.

Sincerely yours,

HERBERT D. VOGEL,
Chairman of the Board.

INTERNATIONAL BROTHERHOOD OF BOILERMAKERS, IRON SHIP BUILDERS, BLACKSMITHS, FORGERS AND HELPERS,
Kansas City, Kans., May 11, 1956.

Senator CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States,
Washington, D. C.

DEAR SENATOR ANDERSON: Thank you for your letter of April 26, 1956, concerning proposed legislation for governmental indemnity to supplement private insurance covering reactor hazards to the public.

Our organization, the International Brotherhood of Boilermakers, is very deeply concerned with the advent of atomic energy as a means of supplementing fossil-fuels for the production of power and heat and the many other uses currently under exploration. We, like the members of the Joint Committee, feel keenly the necessity for the United States to remain in the prominent position of leading the rest of the world in development of atomic power on a basis which is competitive with these existing fuels.

For this reason, this we feel to be necessary as a result of the current world political situation as well as the economic situation in the United States today. In view of the expenditures on the development of nuclear power to date, and in view of the extreme necessity for its rapid development, it would be unthinkable that the matter of insurance would be permitted to stop the development of atomic power and for this reason, we wholeheartedly endorse the program as you outline it in your letter in which the Government provides indemnity over and above a reasonable amount of third-party liability insurance to be carried by the private insurance industry. We also feel that the ceiling of $500 million is very realistic.

In connection with your second point, the liability of reactor operators and equipment manufacturers being limited to their private insurance coverage, and, in addition to the sum made available by the Government for third party claims, we feel that this, too, is very realistic. It would be understandable if the equip-

ment manufacturers would be reluctant to produce the appurtenances to a reactor powerplant if they had no way of knowing whether or not a nuclear incident could result in the bankrupting of their industry.

We agree that some charge should be made by the Government in return for this indemnity and it appears that the use to which you intend to put the funds received is very desirable. In short, we would like to be listed as being thoroughly in accord with the plan you advance in your open letter. We could probably contribute very little in the open hearing. We would, however, like to take this opportunity to give you complete assurance of our support in this matter.

Sincerely yours,

C. F. MacGowan
CHARLES F. MACGOWAN,
International Representative, International Brotherhood of Boilermakers.

SYLVANIA ELECTRIC PRODUCTS, INC.,
ATOMIC ENERGY DIVISION,
Bayside, N. Y., May 11, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. ANDERSON: I should like to express my appreciation for your very kind invitation for Sylvania to participate in the public hearings which will be conducted on governmental indemnity or insurance by your committee. As I indicated in the attached copy of my letter to you of April 6, Sylvania is primarily interested in such liability as may arise from our contemplated reprocessing of fuel elements as well as from the use of fuel elements originally fabricated by us.

In the case of reprocessing, the potential liability which might arise from the handling of large quantities of highly radioactive fission products is comparable to that associated with operation of a reactor. However remote the probability of a catastrophe, its potential enormity cannot in either good conscience or sound business judgment be ignored. In view of the fact that the AEC has requested the industry to submit proposals on commercial fuel reprocessing plants within the next 12 to 18 months, it is essential that protection for this type of plant be worked out in time, so that those companies who are interested in submitting proposals will know where they stand with respect to potential liability.

With respect to the fabrication of fuel elements, our primary concern, as I indicated in my April 6 letter, is the matter of third-party product liability in the remote event of a catastrophe associated with a nuclear reactor in which our fuel elements will be in use. As I suggested in that letter, it is certainly not outside the realm of possibility that liability for all ensuing damages might be imposed on the supplier of fuel elements. However remote either this possibility, or the possibility of liability in connection with reprocessing, we do not feel that responsible management will be willing to run the risk of potentially unlimited liability involved. Thus, in the absence of early and definitive action on the part of the United States Government to share the financial risks and to assure American industry and the public that the matter will be forthrightly dealt with, we believe that progress in this industry will be seriously hampered.

As noted in my letter of April 6, we feel that this is no less a problem concerning fuel elements and reactors sold to foreign countries than it is with respect to those sold for domestic use, particularly in view of the fact that the foreign market is more likely to be important to American industry in the immediate future than the domestic market.

I believe that one additional problem warrants the attention of the committee in connection with this liability problem. The general assumption has been that no concern need be given to the liability problem as it relates to Government-operated reactors and suppliers of such reactors. Actually, our attorneys have informed me that the Government's immunity would not extend to the builder of the reactor or the suppliers of fuel elements or other materials for the reactor in the event that they might otherwise be directly liable for any potential catastrophe. It seems to have been generally assumed, however, that in the case of Government reactors the Government would specifically indemnify all of the sup-

pliers against any third party liability. In our own experience, we have found that this is not necessarily true. In many instances, in dealing with prime and subcontractors of the Commission, we have been confronted with difficulties in obtaining indemnification against third party liability arising from fuel elements which we are called upon to produce. Even where we have dealt directly with the Commission, we have found that the form and coverage of the indemnifications which we have received have varied according to the cognizant AEC Operations Office. In view of this, we feel that it is essential that, if inequities are to be avoided and uniform treatment afforded to the entire industry, any bill which is passed by Congress, must include within its coverage builders and suppliers of government as well as commercially owned and operated reactors.

Subject to the conditions outlined above, we feel that the fundamental thinking behind Congressman Price's, Cole's, or your own proposed bill, would resolve our own liability problem in its narrowest legal sense. However, we do feel that the problem cannot be looked at purely from the point of view of the industry's legal liability. We believe that it is equally essential that the public be assured in advance of complete and unlimited financial protection in the remote event of a catastrophe. We feel that, not only does the general public have an equitable right to such assurance, but that, in addition, unless it is given such protection, obstacles already in the way of industry's development will be further enhanced. By way of one limited example, in selecting plant sites it is essential that we have the fullest cooperation from the local population in obtaining general and, if necessary, legal acquiescence to our site and proposed operations. While widespread misconceptions concerning the accident probabilities of nuclear operations may themselves pose problems in obtaining such acquiescence, such misconceptions may be further enhanced by failure of the Government to stand 100 percent behind the industry. They will, in any event, be all the more difficult to overcome in the absence, at a very minimum, of assurance against financial loss in the remote event that a major accident does occur. In view of these factors, it is our feeling that a bill along the general lines proposed by Representative Price would most adequately provide for the interests of all concerned to be best calculated to foster the rapid growth and development of the nuclear industry.

In your telegram, you requested brief comments on what, if any, factors, other than the insurance question, are impeding progress of the civilian reactor program. Without going into detail on the point, I think that it may be fairly said that the patent provisions of section 152 of the 1954 act have posed a serious deterrent to development of private industry. The opportunity to obtain exclusive rights to and protection for inventions has traditionally been a primary incentive to development and expansion of American industry. Since there are few phases of the atomic industry which do not call for some type of "arrangement, or other relationship" with the Commission, the provisions of section 152 have to all intents and purposes removed this incentive. We feel that the committee should seriously reconsider the wisdom of retaining the present broad provisions of section 152 and further consider at the very least eliminating from that section the ambiguously broad words "arrangement, or other relationship."

I hope that the comments that Mr. Harrison and I have suggested to your committee will prove to be of some help in your deliberations. As I have suggested before, should there be any questions or additional information which you either require or which you feel will be helpful, I will be only too happy to arrange to have either myself or members of my staff meet with you or members of your committee or staff.

In conclusion, please accept my appreciation and gratitude on behalf of Sylvania and the industry as a whole for the interest that you and your committee have taken in our problems, and for your sincere efforts to achieve workable solutions fair to all concerned. We heartily agree with your conclusions that it is in the national interest to encourage the rapid development of an atomic power industry in this country and feel that the efforts of you and the other members of your committee to resolve these difficult problems are well calculated to achieve this end.

Very truly yours,

W. E. KINGSTON,
General Manager, Atomic Energy Division.

SYLVANIA ELECTRIC PRODUCTS, INC.,
ATOMIC ENERGY DIVISION,
Bayside, N. Y., April 6, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. ANDERSON: I should like to express my appreciation for the opportunity afforded Sylvania to participate in the recent hearings held by the Joint Congressional Committee on Atomic Energy in regard to the problem of insurance for atomic-energy installations. At the present time, I should like to discuss this problem as it pertains to the products and services offered by the Atomic Energy Division of Sylvania Electric Products, Inc.

Most of the discussions and deliberations that have been conducted in regard to insurance, have been directed toward the problems associated with reactor builders and operators. While we cannot disagree that this represents the area demanding the greatest attention and concern, the areas concerned with nuclear fuel elements, as well as the reprocessing of fuel elements after their removal from the nuclear reactor, likewise deserve major attention. These latter categories are of specific importance to us, since the Atomic Energy Division of Sylvania Electric Products, Inc., has been engaged in the fabrication of fuel elements for close to 10 years, and future plans call for us to augment our services to include fuel reprocessing as well.

In regard to the problem of insurance as it relates to a producer of fuel elements, we are confident that adequate insurance will be obtainable to cover the risks associated with the production of fuel elements in our plants. However, the important area of uncertainty for us, as a fuel element supplier, is the matter of third-party liability, in the remote event of a catastrophe associated with a nuclear reactor in which our fuel elements have been in use. It is certainly not outside the realm of possibility that liability for all ensuing damages might be imposed upon a supplier. However remote the possibility of the catastrophe or of the supplier being held liable for ensuing damages, we do not believe that responsible management will be willing to run the risk of potentially unlimited liability.

This problem of third-party liability, in regard to the fuel elements, is one which is more pressing from our viewpoint for an early solution, than the problem associated with coverage for the large nuclear powerplants planned by the utility industry. This is so, since these large powerplants are not expected to be operative much before the close of this decade, whereas we expect that we will be supplying fuel elements for commercial research and test reactors within a year.

The fuel element producer is also faced with the problem of adequate insurance for those cases where the fuel is sold to operators of reactors in foreign countries. This problem likewise demands early solution, since the foreign market for nuclear reactors and fuel is likely to be more important to American industry from the short-range viewpoint than the domestic market.

As mentioned earlier, it is our objective to erect a commercial facility for the reprocessing and reconstitution of irradiated fuel elements. Adequate insurance coverage against third-party liability is also of utmost importance in this case. Whereas the potential results of a catastrophe associated with the operation of a reactor, themselves extremely remote, may be greater than in a reprocessing plant, it must be recognized that large quantities of highly radioactive fission products will be handled in such a reprocessing plant which would represent a great hazard to surrounding localities in the again remote event that fission products become airborne or entered the water system. It would be most unfortunate if industry were discouraged from the erection of commercial fuel reprocessing plants due to the lack of adequate insurance, or other similar protection, since it is generally agreed that one of the important aspects to the realization of competitive nuclear power is associated with the establishment of efficient and economical operations for the reprocessing of irradiated nuclear fuel. In view of the fact that the AEC has requested industry to submit proposals on commercial fuel reprocessing plants within the next 12 to 18 months, it is essential that protection for this type of plant be worked out in time, so that those companies who are interested in submitting proposals will know where they stand with respect to potential liabiliy.

We are in agreement with those who feel that the magnitude of the problem associated with adequate protection against third-party liability on nuclear

reactors and associated activities is so broad as to make it quite clear that early and definitive action on the part of the United States Government will be necesary to share the financial risks to assure the American industry and public and atomic-minded friendly foreign countries that the matter will be forthrightly dealt with. The adequacy of protection available at a reasonable cost is a major concern to relatively large-sized companies such as our own. It is obviously of even greater concern to small businesses who are now in or who plan to enter the atomic-energy field. In the absence of some form of unlimited protection against potential liability involved, we feel that at the very least development of private atomic industry would be seriously impaired to the detriment of the Nation's security and general welfare.

I trust that the comments that I have set forth in the paragraphs above will prove of help to you in the deliberations of your committee in regard to this general problem of insurance. Should there be any questions or additional information you require, I will be only too happy to have either myself or members of my staff meet with you.

Very truly yours,

W. E. KINGSTON,
General Manager, Atomic Energy Division.

METALS & CONTROLS CORP.,
Attleboro, Mass., May 15, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
United States Senate, Washington, D. C.

SIR: Our attention has been called to the proposed public hearings on the above subject, and by this letter we wish to present our views on the matter.

First, to identify ourselves: Metals & Controls Corp. is a private industry pioneer in the production of nuclear fuel elements and is the first privately owned facility for the production of such elements. We have been producing fuel elements from enriched uranium since 1952. Currently, we have several contracts with the Commission as a prime contractor, and in addition are subcontractor on other contracts. We have the first license for the production of fuel elements from enriched uranium under the 1954 act, and are producing elements for private nuclear energy industry. We have fabricated, in varying quantity, fuel materials for essentially all of the major AEC sites.

Therefore, as you can well understand, we have a serious interest in the whole question of our liabilities to our personnel, to those with whom we have a contractual relation, and to third parties, in the event of a nuclear incident. At the present time, even though the probability of such an event happening is small, we feel the hazard is large enough to give us considerable worry. Furthermore, we feel that our risks increase with every fuel element made, and thus our concern is both immediate and for the future.

However, we are in the business to stay, both because of our obligation as a company to support the national-defense effort and for commercial reasons; and we intend to bend every effort to improve our technology and productive capabilities to further these ends.

We understand that there is currently available (or will be so very soon) a total of about $115 million in liability insurance. This we shall investigate, and shall arrange to buy the amounts dictated by good business judgment, all factors being weighed. This still leaves unanswered, however, the question of what to do about the enormous liabilities that could arise over the privately available amounts, and as to this, we feel strongly that the Government should, immediately, and not some time in the future, assume the obligation. We are in the business today, and yet we are not covered today as to our potential liabilities.

Our viewpoint is based on the feeling that the development of the utilization of atomic energy, both for military and peaceful purposes, is a matter of vital importance to national defense, and not just the concern of private industry in their commercial activities. Since it is of national concern and scope, the Government should properly assist by safeguarding industry against the kind of calamity that would deter a wholehearted participation thereof in the atomic-

energy program due to the risks involved, or could financially destroy an individual company.

Therefore, it is our respectful opinion that the Government should not, in any legislation or as a result of any existing or future "discretionary" powers, place a limitation on the amount of coverage it will assume. On the other hand, we do not believe that industry should look only to the Government for insurance. In our opinion, industry should buy from private insurers the amount of insurance appropriate for the occasion, and having done that, then should be able to look to the Government for coverage above that amount. If the individual company does not help itself in this way, then the Government should not be obligated to give any protection.

That is, the assistance of the Government should be measured to some extent by the amount of insurance privately purchased by the insured. If the insured purchases all he should take, in view of the particular circumstances, then the Government should be an insurer for whatever additional amount might become obligated.

Again, we stress the point that such legislation is needed now, because the need is here now. Several companies, like ours, have gone ahead in this field at risk to their stockholders, their employees, and to the general public in their neighborhoods. Certainly, it is not too much to ask that the Government, in the light of its broad obligation to the Nation, assume the position of guarantor as to the enormous liabilities that might face any one of us in the event of a bad nuclear incident.

So far in our reading and study of reports and other publications on this matter, we are impressed by the fact that most of the anxiety expressed is in regard to the liabilities of the reactor builders and operators. However, we desire to emphasize the fact that the fuel-element fabricators, as well as all of the other component manufacturers, are equally involved and equally under a risk, and their immediate plight should have equal recognition and remedy.

It is our sincere trust, therefore, that immediately legislation will be enacted for the protection of all of the direct participants in the development of atomic energy, and for all of those "involuntary" participants of a bad nuclear incident.

Respectfully submitted.

CARROLL L. WILSON, *President.*

NEW YORK, N. Y., *May 4, 1956.*

Senator CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Senate Office Building, Washington, D. C.:

Deeply regret that prior commitments will not permit me to appear before the joint committee during its hearings beginning May 15. I am of the opinion that the legislative proposal on insurance which you outlined in your letter of April 26 provides a proper basis for resolving industry's problem of coping with nuclear risks involved in the civilian-reactor program.

The factual information you desire to support the proposed legislation, viz, specifics as to the probabilities of reactor accidents and the extent of damages, and the range of rates to be charged by the insurance industry will no doubt be furnished directly by persons technically qualified to speak on these subjects. I have asked Roger Harris, our vice president and counsel, to review your bill and to offer any suggestions that he may have to your committee. I am confident that the tremendous readjustment in approach occasioned by the 1954 act, both with the AEC and in private industry, is being made expeditiously and that tangible results will be forthcoming.

With best personal regards.

JOHN JAY HOPKINS.

COMBUSTION ENGINEERING, INC.,
New York, N. Y., May 4, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
United States Senate, Washington 25, D. C.

DEAR SENATOR ANDERSON: This will acknowledge your letter dated April 26, 1956, regarding proposed legislation for governmental indemnity in connection with the Nation's atomic power program.

In connection with the summary of the proposed legislation outlined in your letter, we would like to offer the following comments:

1. It is our opinion that governmental indemnity over and above a reasonable amount of third-party liability insurance obtainable from private insurance groups is necessary if the overall progress of the civilian atomic-power program is not to be impeded. We can well understand the Government's desire to place a ceiling on the governmental indemnity for any one nuclear accident. The $500 million ceiling proposed, plus the proviso that any damages over this ceiling would be handled by special legislation, would undoubtedly be a significant step forward in the development of commercial atomic power. With the liability of operators and equipment manufacturers limited to private-insurance coverage plus the sums made available by the Government, the atomic operating and manufacturing companies would no longer have to fear the possibility of damages far beyond their means to pay.

It appears to us, however, that if the ceiling on the governmental indemnity were removed, the basic position of the Government as outlined in your summary of proposed legislation would remain unchanged. In either the case of special legislation or indemnity without a ceiling, the Government would indicate its intention of meeting third-party liability claims beyond reasonable coverage available from private insurance groups. Of the two methods of meeting exorbitant claims, we consider the indemnity without a ceiling preferable. It is our opinion that it is the more positive method of meeting the problem not only from the point of view of the atomic industry, but also from the point of view of the public which might sustain damages or losses in the event of a catastrophic accident.

2. We see no objection to the Government charging an abritrary minimum amount per year to cover its indemnity program; and, certainly, making the proceeds available to the Atomic Energy Commission's research and development program would be desirable.

3. In connection with your request for more specific information on the probabilities of reactor accidents and the extent of possible damage which might be required, it appears that definite answers are next to impossible to arrive at in the present state of the art. It is our feeling that reactors designed with "fail-safety" features and designed to be inherently "self-quenching" are sound precautions against reactor accidents. In addition by enveloping the reactor core in vessels and designing and manufacturing these vessels as well as other nuclear component equipment to the most rigid standards and subjecting them to the strictest inspection procedures known, additional safety is being built into reactor systems. Further, by enclosing the entire reactor vessel and primary system in vapor containers, we feel that the likelihood of an accident causing the release of radioactive products to the atmosphere is extremely remote.

4. Although we are confident that legislation along the lines outlined in your letter or along the lines suggested above would accelerate the atomic-power program, we cannot offer firm assurances that it will, of necessity, do so. This type of legislation should have an immediate beneficial effect on the progress of some of the reactors now being designed for private ownership. We tend to regard the insurance problem as one of several factors that must be overcome before a true commercial atomic industry is created. The other problems relate generally to technical and economic factors. However, the fact that these technical and economic problems still need to be resolved, should not deter the resolution of the complicated insurance problem facing the reactor industry today.

We trust that the comments offered above are of some assistance to you. If you should have further questions, please feel free to contact us.

Very truly yours,

J. V. SANTRY, *Chairman.*

ARMOUR RESEARCH FOUNDATION OF ILLINOIS INSTITUTE OF TECHNOLOGY,
Chicago, Ill., May 7, 1956.

MR. CLINTON P. ANDERSON,
Chairman, Joint Commitee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR MR. ANDERSON: The legislative program which you have proposed in your letter of April 26, 1956, for a governmental indemnity insurance program will do much to insure private industry participation in the field of atomic energy.

Our organization embarked on a specific project of building and using an atomic reactor for research activity more than 2 years ago. These efforts have resulted in the actual design and construction of the first nuclear reactor for private research, and we expect to begin operation this month. Since our various licenses and construction permits were granted under the new atomic energy law, we have faced the usual problems of lack of procedure and policy which arise under any new law. The Atomic Energy Commission has more than extended itself in advice and assistance to us; however, there still remain areas such as insurance which require additional clarification or legislation.

The two major areas of concern to the Foundation at this point are, (1) the need for recognition of the distinction between types of reactors, such as a power reactor or a research reactor, and the potential hazard of each, (2) that insurance premiums can be so prohibitive that we could not afford to obtain coverage.

Private industry cannot, as a matter of good business operation, participate in the development of peacetime uses of atomic energy unless it can adequately insure itself against third-party liability. Such a situation would force our Government to spend money for such development in order to maintain a competitive position with foreign powers. As a result, our Government would not only be spending money for development but would also be assuming third-party liability. It is our considered opinion that the industry reactor safety standards and practices which the Atomic Energy Commission has set up and enforced are more than adequate to protect the general public. In addition, industry is extremely concerned about its obligation to protect the general public and is presently spending large sums of money to provide adeqaute protection.

I am sure you are aware of the difference in the potential hazards between a reactor operated for power, a reactor operated for research as a controlled source of radiation and a reactor which is operated for research on reactors such as a breeder type reactor. While we cannot speak for the power reactor owner or the organization doing research on reactors, we can speak with some authority on the operation of a research reactor such as the one we have constructed. The Foundation has incurred considerable additional expense in the design and construction of our reactor to prevent occurrence of any incident which might endanger the public or public property and feel quite certain that we have been successful in this endeavor. The amount of nuclear material required to operate the reactor is small and every conceivable safeguard has been designed into the system. In spite of our precautions and complete assurance that the reactor is safe, the moral issue of obtaining adequate insurance coverage for a third-party liability in the event of an incident still remains. The determination of adequate coverage is an extremely difficult one. Adequate coverage for one reactor would not necessarily be adequate coverage for another reactor. Establishment of extremely high coverage requirements would certainly prevent small private organizations, such as ourselves, from operating a reactor and, therefore, performing the services that we should and must perform.

Depending on the circumstances, a reactor incident could result in a considerable amount of third-party liability. It is our opinion, however, that the probability of a reactor incident is no greater or perhaps even less than many other industry operations because of the additional attention and money being placed on safeguarding.

We sincerely hope that this information is satisfactory and appreciate your interest in our views on this most vital matter.

Very truly yours,

H. A. LUDY, *Director.*

BENDIX AVIATION CORP.,
Detroit, Mich., May 15, 1956.

Senator CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SENATOR ANDERSON: This will acknowledge receipt of your letter of April 26, 1956, concerning proposed legislation for a governmental indemnity or insurance program to supplement private insurance covering reactor hazards to the public. We very much appreciate this opportunity to submit our views to the Joint Commitee on Atomic Energy.

We are in general accord with the legislative proposal outlined in your letter. We believe that it is quite right and proper for the Government to provide an indemnity over and above the amount provided by private insurance coverage. Although the possibility of a reactor accident is remote, the catastrophic liability that could arise from such an occurrence might greatly exceed all insurance that will be made available for several years at least and therefore we would favor legislation that would provide such a governmental indemnity. Furthermore, we are inclined to feel that the proposed $500 million of governmental indemnity represents a reasonable amount of protection for those engaged in the atomic power industry, particularly when the insurance companies may ultimately be able to offer coverage to the extent of some $65 million.

While we feel that the governmental indemnity should, if possible, be made available to the atomic power industry without charge, we recognize that such action may not be practicable and we would. therefore, be inclined to favor a reasonable charge as suggested in your letter, with the funds collected being devoted to atomic safety research. However, care should be taken so that the Government assessments are not excessively high. In this connecton, we would hope that the Government would not try to support all of its research and development work on atomic safety from such charges, because we think this would makes the charges quite high. The program which the AEC is carrying out on atomic safety—in particular the tests being carried out at ARCO in testing reactors—to destruction—is extremely worthwhile and is giving very vital data for assessing the probability of reactor accidents, the extent of damage, and for helping industry to design safer equipment. Also, in the various existing nuclear installations, industry is already spending considerable money for their safety work program. This is already a heavy expense and we do not believe that industry should be asked to assume the entire burden of the costly experiments that will be required in the various research and development programs on atomic safety.

It is our understanding that the Stock Company Casualty Reactor Pool may soon be able to provide in the neighborhood of $50 million of third-party liability insurance. However, at the present time there is no indication as to what rates will be charged for this insurance. Certainly the insurance industry must recognize the necessity of establishing reasonable rates because excessive insurance costs would tend to discourage the desired expansion of atomic power by industry.

We also understand that there is some question as to whether or not the facilities of the Reactor Insurance Pool will extend to small, experimental and demonstration reactors since the insurance industry appears to believe that existing insurance can be made avalable for them, due to the limited hazard involved. If this development materializes, we would be interested in receiving assurance that the proposed governmental indemnity would be available to this type of reactor even though they are insured by the usual insurance policies rather than the Reactor Insurance Pool.

It is definitely our opinion that legislation along the lines suggested in your letter of April 26, 1956, will result in the acceleration of industry's atomic power program. We wholeheartedly concur in the viewpoint that it is in the national interest to encourage the rapid development of an atomic power industry in this country.

In general, the recent report prepared in March, 1956, for the Atomic Industrial Forum, Inc., entitled "Preliminary Report on Financial Protection Against Atomic Hazard" appears to us to be an excellent survey of the problems faced by the atomic power industry in all their various aspects.

If you wish, we shall be glad to furnish any specific data or material in our possession which you may desire.

Very truly yours,

M. P. FERGUSON, *President.*

PERTINENT EXCERPT FROM PRELIMINARY REPORT ON FINANCIAL PROTECTION AGAINST ATOMIC HAZARDS, PREPARED AS PART OF AN INDEPENDENT RESEARCH PROJECT CONDUCTED BY LEGISLATIVE DRAFTING RESEARCH FUND OF COLUMBIA UNIVERSITY

III. THE NATURE AND OBJECTIVES OF A GOVERNMENT PROGRAM

Any program adopted by the Government should have limited objectives. Because of lack of knowledge and experience, many problems which will arise can-

not be forseen. The more elaborate the program the less adaptable it will be to meet changed circumstances. Increased knowledge and experience may later reveal the inappropriateness of any program now adopted, and it is, therefore, extremely important that such a program be pragmatic and responsive to changing needs. Moreover, since it now appears that the probability of a catastrophe is small, it would be undesirable for the Government to establish a complex mechanism to deal with the possibility of such a catastrophe.

Two primary requirements which must be met by any Government program are:

(1) The reactor industry should be afforded an opportunity to protect itself against unknowable liability to third parties, and so be relieved of the fear of liability for catastrophic losses.

(2) The public should be thoroughly protected against personal injuries and property damage. Although we do not expect much dissent from this general proposition, there may be some question as to the practicability of total compensation.

Efforts to make sure that injured members of the public will be recompensed could proceed in two directions. The Government could act to strengthen the ability of the public to shift the risk of loss. The Government could also act to strengthen the ability of the reactor industry to satisfy potential liability. Although in this report we have concentrated our attention on the latter approach, ultimately an overall solution of the problem must take into account ways in which the public may iself shift the risk.[51] However, even if the public were enabled fully to shift risks of loss, the problem of the reactor industry would not, thereby, be solved.[52] Claims against it may still be made by injured persons and their insurers.

There are certain conditions basic to the success of the liability insurance approach. We assume that there is small probability of a catastrophic reactor accident. We further assume that noncatastrophic accidents will present problems not significantly different from those created by other industrial operations. Unless these assumptions are correct, it seems to us that there is serious question whether the development of atomic energy can be fitted within the existing pattern of legal liability and liability insurance.

It is only natural that throughout its short history the problem of obtaining protection against liability in the atomic energy field should have been called an atomic "insurance" problem and that suggestions that the Government play a role in solving the problem should be debated in terms of the need for a Government atomic "insurance" program. Whether Government insurance programs are really "insurance" is a question we do not examine here. Insurance can be and is defined in a number of ways, and to debate its definition does not answer the question—with which we are most concerned—of what, if anything, the Government should do. For our purposes we will restrict the use of the word "insurance" to the coverage offered by the private insurers and apply the broader word "indemnity" to describe a Government program.

As we see it, the role of the Government, unlike its role in programs such as crop insurance, deposit insurance, and the proposed flood insurance program, will not be that of insuring against reasonably expectable and recurring losses. This type of coverage will be available in the private insurance market.

Several suggestions have been made as to the method by which the Government could proceed in an effort to solve the problem of liability for catastrophic damage. They have included a program similar to war damage insurance, Government reinsurance, direct Government excess insurance, general indemnity legislation, an extension to licensees of the protection now afforded contractors, and statutory limitation of liability.[53]

To limit liability by statute without making provision for compensation for damages in excess of the limit would deny the public the protection we think is required, and we have not therefore considered in detail the feasibility of such a limitation.

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[51] Many people will want property and other types of insurance protecting against radiation damage eevn if they are assured of ultimate recovery from someone who may be liable, if only because of the possible delay in paying claims.

[52] Similarly, the solution of the liability insurance problem will not be a panacea. If damage is caused not by large individual exposures but by an accumulation of "safe" exposures, it may be impossible to fix liability on a single source. Reparation in such a case would have to be otherwise provided for. See Glasstone, op. cit. supra, note 5, at 535 for a discussion of possible cumulative effects.

[53] See Satterfield, The Position of AEC in the Insurance Problem, press release of speech before the National Industrial Conference Board, October 26, 1955, p. 3 (mimeographed).

Instead of attempting to evaluate the merits and demerits of the other suggestions seriatim, it has seemed to us more effective to examine the significant questions of policy and method applicable to a special program in this field. In the following pages we examine the role of the Government in three important aspects: the extent of Government participation, financing, and the necessity for compulsion.

IV. THE EXTENT OF GOVERNMENT PARTICIPATION

Partcipation by the Government raises questions of the point at which the Government should enter the field and the upper limit, if any, on that participation.

A. *Point of entry*

The Government could establish an indemnity program in competition with the private insurance companies, offering coverage from the ground up. To do so would be at odds with the intent expressed in the 1954 act to develop atomic energy within the framework of private enterprise, where consistent with overall objectives. Furthermore, such action would be contrary to the practice which the Government has generally followed [54] in other "insurance" programs. Where the Government has entered an area of possible conflict with private insurance its entry has usually been conditioned on the nonavailability of insurance in the private market.[55] We feel generally that a Government program in this area should be so conditioned.

The condition that private insurance be unavailable should not mean, however, that an insured must have exhausted the private insurance market before being eligible for a Government indemnity. The aim of the Government should be to place a ceiling on the amount of liability for which the reactor industry must provide through normal channels and, in that area, let risks be carried or insured as individuals see fit, subject, however, to a requirement that the public be adequately protected.

Whether the ceiling should be at the same level for all reactors is a question which requires careful study. Depending upon a number of factors, there may be a substantial difference in the hazards created by the operation of different reactors. The private insurers are planning to adopt rates reflecting relative hazard; if the cost of private coverage up to a common level proves to be no greater relative burden upon one reactor than upon another, then none can complain.

If, however, in spite of rate differentials, the operator of a small-risk reactor must shoulder a disproportionate burden, we suggest that some consideration be given to establishing statutory categories of lesser risks for which Government participation may start at a lower level.[56] A special category may, in any event, be desirable for research reactors, at least those operated by universities or other nonprofit institutions. The purpose of these reactors and the character of the institutions involved may justify special consideration.

B. The upper limit

It seems clear to us that to set an upper limit upon the coverage provided by the Government would to some degree defeat the fundamental purposes of a Government program. Though it may be true that the reactor industry would

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[54] National service life insurance and World War II war risk cargo insurance are exceptions. In both cases there were special reasons, not present here, for establishing a competitive program. On the other hand, the Government has utilized private insurers to write Federal employees' group life insurance, act of August 17, 1954, c. 752, sec. 2, 68 Stat. 736, 5 U. S. C., sec. 2091 (Supp. II, 1955). In the case of workmen's compensation, some State governments compete with private insurers; other State funds preempt the field to the exclusion of private insurers.

[55] For example, the Lehman flood insurance bill provides that: "It is the purpose of this act to authorize and direct the establishment of a program of Federal insurance and reinsurance against the risks of loss resulting from floods * * * to the extent that such insurance or reinsurance is not available on reasonable terms and conditions from other public and private sources * * *." 102 Congressional Record 1779 (February 6, 1956). When crop insurance was originally written by the Government, private insurance was not available. We understand that private insurers are now planning to write crop insurance. We do not know as yet the extent to which there may be competition between the programs.

[56] If the Atomic Energy Commission requires proof of financial responsibility for liability to third parties as a condition of licensing, as it is considering (see note 29, supra), it must necessarily fix a limit of financial responsibility to which a particular licensee will be held. Unless it fixes the same amount for all reactors, the variable amounts might well serve as a basis for establishing such categories.

be willing to proceed [57] with something less than unlimited coverage, the public could not thereby be assured of full reparation [58] for its damages.

The only consideration which would justify a compromise with the ideal of complete reparation to the public would be the possibility of imposing too great a burden upon the Government. Since the possibility of an atomic reactor catastrophe is remote and any one disaster, though huge by ordinary standards, will not significantly impair national resources, full reparation by the Government would appear to be feasible. In contrast, the possible impact of war damage on national resources could be so great that full reparation by the Government would not be justified.[59]

Should atomic accidents happen with such frequency that they become a real threat to our economy, we can then reexamine the question of full protection. Indeed, we can then reexamine whether the rapid development of peaceful atomic energy is worth the cost.

V. Financing

If the Government should establish an indemnity program the question of what, if any, fee or "premium" to charge immediately arises. The imposition of a moderate charge will probably not be opposed by the reactor industry.[60] Whatever charge is made, however, seems certain to be a bone of contention.

It seems to us that some of the controversy could be avoided if it were recognized that any charge made by the Government must be arbitrary. If the Government offers the high or unlimited coverage [61] needed to accomplish the purposes of an indemnity program, the only one of the elements of an insurance premium [62]—losses, expenses, margin for profit—which can be computed with any degree of accuracy [63] will be the cost of administration. If the program is administered through the Commission's licensing process, the cost of administration may be nominal.[64]

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[57] Although the reactor industry may be willing to proceed with a limited amount of coverage, the possibility of catastrophic liability exceeding coverage would still exist. Such an event might not only bankrupt the reactor industry but also could create serious economic difficulties for the general public.

[58] By full reparation we mean the pecuniary reparation afforded according to rules of damages under tort law. The recovery of an individual will vary according to many factors beyond the scope of this study. For example, "wrongful death" statutes in a number of States fix the amount recoverable for tortious killings. For a dramatic example of how "full reparation" may vary depending upon the application of such statutes, see *United States* v. *Union Trust Co.*, 221 F. 2d 62 (D. C. Cir.), affirmed, — U. S. —, 76 Sup. Ct. 192 (1955) (decision in companion case reversed on other grounds sub nom. *Union Trust Co.* v. *Eastern Airlines*, — U. S. —, 76 Sup. Ct. 192 (1955).

[59] The statement of Elmer B. Staats, Assistant Director of the Bureau of the Budget, in War Damage Corporation Act of 1951, hearings before a Subcommittee of the Senate Committee on Banking and Currency on S. 114, S. 439, S. 1309, and S. 1848, 82d Cong., 1st sess. (1951), pp. 225–247. In World War II, although the War Damage Corporation issued policies to an aggregate face amount of $140,000,000,000 the Congress appropriated only $1,000,000,000 as capital for the Corporation, so that Government commitment was limited to that amount. 28 Encyclopedia Americana, 677 et seq. (1950).

[60] See the statement by Willis Gale, chairman, Commonwealth Edison Co. of Chicago, before the Joint Committee on Atomic Energy of the 84th Cong., 2d sess. (Feb. 16, 1956): You might ask whether we would be willing to pay for this assumption by the Government of the catastrophic risk? Again the answer is, 'Yes,' if the economics of our project would not thereby be destroyed."

[61] As we have noted above, the problems of the private insurer in fixing rates for smaller, limited coverage will be considerable.

[62] Presumably the Government will not want to make a profit. Even in the case of private insurers the rates charged for liability coverage against radiation damage cannot be expected in the near future to cover a catastrophic atomic accident. Such losses would have to be paid out of capital and surplus.

[63] "Something of a legend has grown up around the making of insurance rates. The impression has been created that insurance experts can make accurate prophesies of future losses and expenses by applying mathematical formulas to accumulated statistical data. While both statistical and actuarial procedures have been developed to a high point and have proved their usefulness, the fact remains that it is impossible to take into account all possible influences on insurance costs with sufficient accuracy to make rates that will exactly measure them." Mowbray and Blanchard, op. cit., supra, note 21, at 341.

[64] The difficulty in fixing a proper rate in the absence of loss experience is exemplified by the experience of the War Damage Corporation. The premium for war damage insurance was based at best on a guess, with the "hope" that the premiums would cover losses. In about 2 years nearly $250,000,000 in premiums had been collected. Total losses amounted to only $1,274,000. Yet a single successful enemy bombing attack upon a metropolitan center could have made premiums insufficient to pay losses. War Damage Corporation Act of 1951, hearings before a subcommittee of the Senate Committee on Banking and Currency on S. 114, S. 439, S. 1309, and S. 1848, 82d Cong., 1st sess. (1951), p. 126.

In view of these facts it might be appropriate not to make any charge for Government coverage.[65] The concept of a Government indemnity program without premiums is not new. For example, we now have a Servicemen's Indemnity Act which replaces in-service insurance for the Armed Forces.[66] During World War II war-caused injuries to civilian employees of Government contractors were handled by an indemnity program.[67] In connection with the proposed war damage insurance program of 1951, the Bureau of the Budget opposed an insurance program and advocated an indemnity program.[68] In the latter two cases, a primary reason given in favor of a free indemnity program was that the protection sought could not be furnished on an insurance basis.

The free indemnity programs mentioned above have been proposed or undertaken in connection with war or national defense activities and have been justified on the basis of a special Government interest in and responsibility toward those who suffer by reason of such activities. On the other hand, the Government may have a comparable interest in getting the industrial reactor program moving.[69]

The obvious objection to a free indemnity is that it amounts to a Government "giveaway." Even if we accept the view that, at present, a charge could not have a meaningful basis, the urge is strong to charge something in the belief that this avoids a hidden subsidy. "The AEC has taken the forthright position that financial assistance to private power reactors should be in a form which can clearly be identified and measured."[70] However, this healthy principle cannot be applied where, as here, the amount of assistance cannot be measured.

If it is felt that some charge should be made it should be recognized that, at present, such a charge will be arbitrary. So long as a meaningful rate cannot be established, the charge should not be justified on the basis of an inappropriate analogy to insurance ratemaking.

VI. COMPULSION

The problem of protecting the public is not solved by making liability coverage available. So long as the coverage is not free, some persons will not insure unless they are compelled to do so. Two separate questions of compulsion arise—first, shall the reactor industry be compelled to buy insurance up to the point at which Government coverage becomes available, and second, shall it be compelled to pay whatever charge may be fixed for the Government coverage.

With respect to private coverage, we think that the Government should take affirmative steps to see that the operator has made adequate provision to compensate those whom we may damage. To insist upon adequate provision by the operator is not, however, to require that he purchase insurance.

If he can show that he is financially able to pay losses out of assets which are and will remain available for such a purpose he should be allowed to make his own decision with respect to insurance. With respect to Government coverage, it is obvious that no private companies could furnish proof of ability to pay damages which might run into billions of dollars. We think, therefore, that Government coverage should be compulsory. Any other position would allow the protection of the public to depend upon the decision of the operator. Further, it is unlikely that the Government would be willing to treat victims of separate accidents differently because the operators had made

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[65] The promotion of safe practices through the reduction of premiums would not be an important factor in a Government program, so long as the Atomic Energy Commission continues to have full responsibility for safety. Moreover, the healthy function served in this c nnection by private insurance companies will be well taken care of by their substantial interest in the program up to the point at which the Government assumes liability.

[66] Act of April 25, 1951, ch. 39, sec. 2, 65 Stat. 33, as amended August 24, 1954, ch. 887, sec. 1, 68 Stat. 780, 38 U. S. C., sec 851 (Supp. II, 1955).

[67] Act of December 2, 1942, ch. 688, sec. 101, 56 Stat. 1028, as amended, 42 U. S. C., sec. 1701 (Supp. II, 1955).

[68] War Damage Corporation Act of 1951, hearings before a subcommittee of the Senate Committee on Banking and Currency on S. 114, S. 439, S. 1309, and S. 1848, 82d Cong., 1st sess. (1951), p. 173. Neither program was adopted.

[69] The McKinney report takes the position "that the urgency associated with the [atomic energy] program requires that the technological resource of atomic power be fully explored with high priority." McKinney Report, vol. 1, op. cit., supra, note 6, at 2. See New York Times, February 25, 1956, p. 6, column 3, for a recommendation that the Government spend $1 billion over the next 5 years in the development of atomic power.

[70] Marks and Trowbridge, op. cit., supra, note 12, at 45.

different business judgments as to the desirability of insurance coverage.[71]

Compulsion has been a feature of other Government indemnity programs. Indeed, the Government's power of compulsion frequently makes possible the success of such programs where private insurance is not feasible. For example, through its power to grant and revoke charters or memberships, the Government made deposit insurance compulsory for national banks and member Federal Reserve banks respectively.[72] Similarly, the Atomic Energy Commission could use its licensing power to compel appropriate action. The Commission has already indicated that it is giving some thought to requiring proof of financial responsibility as a condition of the issuance of a license.[73]

The most serious problem may come in the case of reactors operated by universities,[74] public or private, or reactors owned by States, or municipalities.[75] In some jurisdictions private universities and other eleemosynary institutions are immune from tort liability.[76] States, municipalities, and their universities are generally immune[77] from liability under the doctrine of sovereign immunity.[78]

We do not think it necessary or appropriate to reexamine here the validity of the reasons underlying the doctrines of sovereign and eleemosynary immunity in the usual tort situation. The threat posed by radiation is such that the policy of requiring adequate provision for reparation to those damaged may override the policies and theories which give rise to the immunity doctrines. The same considerations which justify a Federal indemnity program also justify a requirement that all who would operate reactors shall be bound to compensate those who may suffer damage by reason of such operation. Accordingly, the Commission might require a waiver of immunity as a condition of granting a license. The possible constitutional questions which may arise from such a requirement, as well as the mechanics by which a State, municipality, or an eleemosynary institution may waive its immunity, require considerable attention.

VII. CONCLUSION

We must emphasize again the preliminary nature of this report. The most we have been able to do is to adumbrate the considerations which we think govern a program designed to meet the needs of the public and the reactor industry in the present context. A program which placed a ceiling on the damages for which the reactor industry would have to make its own provision and which, at the same time, assured the public of compensation for damage done by radiation would, we think now, solve the immediately pressing problem.

Much additional work remains to be done on these questions and others. Problems of administration, such as the form of the indemnity, provision for loss adjustment in the catastrophe situation, adjustment of the relationship between members of the reactor industry who may be liable for a single accident, and many others have been given only cursory attention. We trust that by the time of the final report we will have been able to explore many more of these problems.

Chairman ANDERSON. All right, Mr. Black.

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[71] In the case of war damage, where presumably the potential injured himself would have the option of purchasing or not purchasing Government insurance, doubt has been expressed that the Government would find it desirable to make payments only to those who bought the insurance. War Damage Corporation Act of 1951, hearings before a subcommittee of the Senate Committee on Banking and Currency on S. 114, S. 439, S. 1309, and S. 1848, 82d Cong., 1st sess. (1951), p. 239.

[72] Act of June 16, 1933, ch. 89, sec. 8, 48 Stat. 168, 12 U. S. C., sec. 1811 (1952 edition).

[73] See note 29, supra.

[74] "* * * it is clear that a research reactor operating at moderate power levels may be a hazard to a wide area." M. M. Mills, Hazards of Low Power Research Reactors, in The Role of Engineering in Nuclear Energy Development (Proc. Third Annual Oak Ridge Summer Symposium), p. 412, TID 5031 (1951).

[75] See New York Times, February 8, 1956, p. 21, col. 1, for a list of applications.

[76] A majority of States hold either that eleemosynary institutions have no immunity or that their immunity does not bar recovery by strangers. Prosser, Torts (second edition, 1955), pp. 786–788. In some States in which immunity is available to the eleemosynary institutions, a majority holds that the immunity does not extend to other than eleemosynary activities. A few States which grant immunity hold that immunity is waived to the extent liability insurance is purchased. Annotated, 25 A. L. R. 2d 29, 131, 136 (1952).

[77] The distinction between "proprietary" and "governmental" functions may limit this immunity in some instances. The courts have had great difficulty in classifying particular functions as one or the other. Prosser, op. cit., supra, note 75, at 775.

[78] This immunity would not protect the suppliers and others who might be liable for damage caused by a reactor accident.

STATEMENT OF KENNETH E. BLACK, PRESIDENT OF THE HOME INSURANCE CO. AND CHAIRMAN OF THE NATIONAL BOARD OF FIRE UNDERWRITERS COMMITTEE

Mr. BLACK. My statement is a short one and I am perfectly willing to file it.

Chairman ANDERSON. I would prefer to have you read it.

Mr. BLACK. My name is Kenneth E. Black. I am president of the Home Insurance Co. and chairman of the National Board of Fire Underwriters Committee to provide property damage insurance for nuclear installations.

As you know, we are well on our way to providing a facility for insuring nuclear reactor installations against property damage by hazards attending their operation. We are bringing virtually every stock property insurance company in the country into a syndicate for this purpose. The organization meeting of this syndicate will be held in New York on May 25. It is our intention to supply a capacity sufficient to meet the insurance requirements on any reactor now contemplated or in the drawing-board stage. At this moment, we are not confronted with a capacity problem. We have been in touch with the Atomic Energy Commission on the subject since March 1955 and have been conducting a close liaison with regard to problems of the reactor owners and operators and the hazards that we would be expected to insure. As is readily understood by members of this committee, many problems are presented but gradually they are being solved.

We feel that proposed legislation before this committee is in the right direction, but most certainly it would be presumptuous on our part to attempt to advise the owners or operators or this committee as to the type of legislation they should have to best suit the needs of all parties at interest. To be specific, however, we do think that the ideas outlined by the chairman of this committee have merit as well as the bill proposed by the Atomic Energy Commission.

There have been many questions raised with respect to the rate we will charge for our insurance when the syndicates are finally organized and we are in possession of sufficient information to establish rates. While our engineers and technicians, who will be charged with the problem of making these rates, are diligently studying the new science, you must bear in mind that up to the moment they have never seen a reactor nor have they much conception of what we are calling upon them to rate. We are, in effect, asking our people to buy a "pig in a poke" when we ask them to put a rate on something with which they are as yet only vaguely familiar. The best assurance I can give you on this important point is to quote from the statute under which we operate in the majority of the States. The all-industry fire rate regulatory law declares as its purpose:

> To promote the public welfare by regulating insurance rates to the end that they shall not be excessive, inadequate, or unfairly discriminatory.

We must according to law, meet this standard in arriving at a rate for the reactors under consideration.

Chairman ANDERSON. We thank you, Mr. Black. You list only property damage, so you do not intend to participate in the public liability pools then?

Mr. BLACK. Not through this syndicate, sir.

Chairman ANDERSON. And you speak again on the second page, of when the syndicates are organized, and you refer again to the syndicates that will handle fire coverage and property damage coverage and things of that general nature, is that correct?

Mr. BLACK. That is correct.

Chairman ANDERSON. Without regard to the liability problem, that more properly would be in the hands of the casualty companies?

Mr. BLACK. That is correct, sir.

Chairman ANDERSON. And you see no problem as far as fire insurance or property insurance, as such, might be concerned at the present time?

Mr. BLACK. For the owners and operators of the reactors, that is right.

Chairman ANDERSON. Well, I think that is a very useful statement, because that clears up that part of the insurance problem. It gives assurance on that.

In the bill we finally consider and which we hope to submit one of these days we need concern ourselves only with the question of liability that may occur as a result of the operations of the reactor.

Mr. BLACK. Yes, sir.

Chairman ANDERSON. Thank you very much.

The next witness is Mr. Stevens.

STATEMENT OF STODDARD M. STEVENS, A MEMBER OF THE LAW FIRM OF SULLIVAN & CROMWELL, NEW YORK CITY; ACCOMPANIED BY GEORGE C. KERN, JR., AN ATTORNEY WITH THE FIRM OF SULLIVAN & CROMWELL, NEW YORK CITY

Mr. STEVENS. Mr. Chairman and gentlemen of the committee, I appreciate very much the opportunity to appear before you to discuss the problems of legislation dealing with third-party liability in the atomic energy field. My name is Stoddard M. Stevens and I am a member of the law firm of Sullivan & Cromwell of New York City.

I should like to begin by attempting to define the problem as I see it.

There are certain risks connected with almost all industrial processes: Plant and equipment may be damaged; employees may be injured; there may be injury to persons and property of persons who are strangers to the enterprise. I do not see any particularly unique problem in the atomic energy field with respect to damage to plant, equipment, or injury to employees. The magnitude of possible damage to the plant and equipment of a reactor installation can be assessed and there is every expectation that appropriate property damage insurance will be available, although insurance against loss of use still presents thorny problems. While certain revisions in the workmen's compensation laws of some States may be required, such as possibly broadening the definition of occupational diseases to include diseases caused by exposure to radioactive substances, it is generally believed that these changes can be made without too much difficulty and that adequate workmen's compensation coverage for employees who work in reactor installations can be provided by existing insurance facilities.

Chairman ANDERSON. Could I stop you there to ask whether you may recognize that there may be some problem in connection with the statute of limitations on the filing of claims for workmen's compensation cases?

Mr. STEVENS. Very definitely; yes, sir.

Chairman ANDERSON. Most of the laws have a provision of a year or something of that nature, under which a claim must be filed after injury. The question is whether it should be filed after exposure to radiation.

Mr. STEVENS. That is going to raise some unusual problems. You will recall in the Pittsburgh-DesMoines case, Moran against Pittsburgh and DesMoines, the suits against the Pittsburgh and DesMoines Co. were brought almost exclusively by the persons who were the employees of the gas company in Cleveland, and who had not been satisfied by workmen's compensation insurance. I think there were some 161 suits brought against the Pittsburgh and DesMoines Co.

It is potential claims for personal injury and property damage suffered by members of the general public which present the unique problem in the atomic energy field. This unique problem stems from two sources: Legal and technological.

The Anglo-Saxon law traditionall has imposed liability for harm done to others on the basis of negligent action or failure to act. But over the years the basic principle that there should be no liability wi hout fault has been gradually attenuated to the point where, today, fault sometimes means that a defendant has failed to measure up to some ideal standard, imposed with the wisdom of hindsight and regardless of whether the defendant knew or should have known the standard or was capable of meeting it. A still further development of the law has been in the direction of a doctrine of absolute or insurer's liability. Under this theory, a plaintiff need not prove negligence or fault, but needs prove only the fact of an accident, a casual connection between the defendant's product or conduct and the accident and a loss or injury resulting from the accident.

By these comments I most certainly do not mean to imply that the atomic energy industry will inevitably be burdened with an insurer's liability or impossibly high standards of care. It is possible that the courts might find that the legislative authorization for and licensing of atomic energy work and the benefits to the Nation to be derived from industrial development of this new force require that liability be based on negligence. Also, in the rigid safety standards imposed by Federal and State governments with respect to all phases of construction and operation of reactor facilities, the courts might find the existence of adequate and known standards against which a defendant's conduct can be measured.

This problem of potential liability concerns not only the operators of reactor facilities but also suppliers of reactor equipment and components, fabricators of fuel elements, and persons responsible for designs and engineering, and installers and services of equipment. In certain respects the problem of potential liability facing these nonoperators is even greater than that facing the owners and operators of nuclear energy facilities. For example, in the event of a reactor accident the plaintiff may attempt to join such parties as defendants along with the reactor operator. In such a case the equipment sup-

plier could be held liable for the entire amount of the plaintiff's claim, or, if both the supplier and operator were found to have contributed to the accident, an apportionment of damages between the parties might be made if a logical basis were to exist for such apportionment.

If the case is founded on the theory of absolute liability, under the existing case law, even if absolute liability is imposed upon the operator, any one other than the operator should be found liable only if his negligence is proved.

However, if recovery is had against the operator on the theory of absolute liability, the operator might seek contribution from the suppliers or others who might be proved to have caused or contributed to the accident through negligence.

Negligence is an elusive concept at best, but when idealistic standards are imposed long after the fact, liability on the basis of negligence can approach, in practical effect, absolute liability. Thus the supplier of a small component, for example, may through expert testimony as to what the standards of care should have been, given long after the construction of the component, be held liable for the total recovery levied against the operator.

This liability could conceivably result even though the component supplier had relinquished title to the operator long before the accident, had satisfied all the specifications of his customer, and had exercised no control over the operation of the facility. Still another theory on which the operator might recover against the equipment supplier could be for breach of express or implied warranty; on this theory, it would not be necessary to establish negligence on the part of the defendant supplier.

The technological phase of the third-party liability problem arises from the theoretically possible magnitude of possible damage to persons and property which might be occasioned by an atomic accident, and the practical impossibility of assessing that magnitude in advance.

The problem, therefore, which faces the new atomic energy industry and this committee, is that the application of impossibly high standards of care or the doctrine of absolute liability to this industry will confront it with a potential liability which in its fullest possible technological magnitude is incalculable and uninsurable. I do not feel that resolution of this problem means a choice between the development of the atomic energy industry on the one hand and safety of the public on the other. There is, I believe, a solution which will at once permit of the desired progress in the development of industrial uses of atomic energy and ensure adequate safeguards to the health and safety of the public.

The first line of protection for the public lies in the skill and integrity of the atomic industry. No public utility in this country is going to commence operation of an atomic reactor until the responsible executives both of the utility and the equipment manufacturers supplying the reactor are completely satisfied as to the safety of the installation.

Quite apart from any moral consideration, it would be financially disastrous for any public utility or any equipment manufacturer to permit operation of a reactor which subsequently caused great harm and was found to have been constructed or operated without diligent care. The enormous financial stake represented by the investment

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of utilities and equipment manufacturers in atomic energy (and it must be kept in mind that years will pass before this investment is recouped and even more years before there is any reasonable return on this investment) is, in and of itself, enough to insure that everything humanly possible will be done to protect the public against atomic accidents.

The second line of protection for the public lies in the close regulation of health and safety factors of reactor facilities by the Atomic Energy Commission and the various States. Numerous provisions of the Atomic Energy Act of 1954 authorize and require the Atomic Energy Commission to regulate the atomic energy industry so as to insure the public health and safety.

The legislative concern with this problem is made clear in section 3 of the act where it is declared that one of the purposes of the act is to provide for a program to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the health and safety of the public. Secion 161 (b) authorizes the AEC to establish such standards and instructions with respect to possession and use of special nuclear material, source material, and byproduct material as it deems necessary or desirable to protect health or to minimize danger to life or property. Section 161 (i) (3) authorizes the Commission to prescribe such regulations or orders as it may deem necessary to govern any activity authorized by the act, including standards and restrictions governing the design, location, and operation of facilities, in order to protect health and to minimize danger to life and property.

Sections 53, 63, and 81 require the Commission to take account of health and safety factors in establishing criteria for the issuance of licenses for possession or use of special nuclear material, source material and byproduct material and sections 103 and 104 require the Commission to pass upon the adequacy of the applicant's ability to meet the AEC's safety standards as a condition precedent to the issuance of licenses for the manufacture, production, transfer, acquisition, possession, importation or exportation of production or utilization facilities.

These statutory provisions have beetn implemented by detailed regulations issued by the AEC. Under the AEC regulations, applicants for licenses to possess or use nuclear materials are required to submit information on the technical qualifications of their personnel, on the nature of the protective equipment and material to be used and on proposed safety procedures, including procedures to avoid accidental conditions of criticality and procedures for personnel monitoring and waste disposal. By these regulations, the AEC is required to make a finding that the applicant's proposed equipment, facilities, and procedures are adequate to protect health and minimize danger to life or property.

The safety regulations with respect to licenses for production or utilization facilities are even more detailed. Applicants are required to furnish information on all factors relating to health and safety in sufficient detail to permit AEC evaluation of the radioactive hazards involved.

The required information includes design criteria essential for safe operation, site data, procedures for routine and nonroutine operations

and for minimizing operational mishaps, plans in the event accidents occur which would create radioactive hazards, and proposed measures to prevent accidents. In addition, regulations dealing with operators' licenses provide for a showing that the applicant has learned to operate the controls in a competent and safe manner. A still further check on safety requirements is found in the provisions in the regulations which permit continuing inspection by the AEC after the issuance of the various types of licenses and which make the licenses subject to revocation or amendment for cause.

That the Atomic Energy Commission is diligently performing its duties with respect to health and safety pursuant to the legislative mandate is indicated not only by the issuance of detailed regulations on the subject but also by the exhaustive inquiries made by the AEC prior to the recent issuance of the first construction permits for private construction of large-scale nuclear powerplants.

In announcing these two permits the AEC stated that it had made sure that the two companies involved had submitted sufficient information to give reasonable assurance that the facilities could be constructed and operated at the proposed locations without undue risk to the safety and health of the public.

In addition to health and safety regulation by the Federal Government, a number of States have proceeded with health and safety measures. I do not intend by mentioning the activities of the various States in this connection to advance any view as to the question of delineation of the respective powers and responsibilities of the Federal and State Governments.

As examples of State activity in this field, the California Division of Industrial Safety has issued orders establishing standards for protection of employees against radiation including such matters as maximum permissible exposures, requirements for instruction, monitoring, and maintenance of protective devices, and the New York Department of Labor has issued rule 38 of the Industrial Code which provides for such things as registration of all installations where sources of radiation are used, operated, or stored, control of exposure, surveys, dose limits, and warnings.

As a result of these economic realities and governmental regulations I believe it is clear that no legislative action taken to resolve the dilemma facing the atomic-energy industry with respect to third-party liability will result in any lessening of protection for the health and safety of the public. Therefore, it seems to me that the sole remaining policy question is whether a legislative solution to this problem of potential liability will further the legislatively proclaimed purposes of the Atomic Energy Act of 1954, namely, the encouragement of widespread participation in the development and utilization of atomic energy for peaceful purposes. I believe that the testimony of other witnesses before this committee, better qualified than I to speak on questions of business policy, will demonstrate a definite relationship between the liability problem and the future progress of industrial development of atomic energy.

Turning now to the possible form of legislative action, I do not believe that the Government should assume all third-party liability. The private insurance industry has indicated that it can, and it should be expected to, provide insurance against substantial amounts of liability.

For example, it was announced recently that third-party liability insurance, against damage from radiation, will be provided, up to $50 million for each reactor, by a syndicate of many of the Nation's capital stock casualty insurance companies. Certain problems, such as the amount of premiums, allocation of premium costs, and distribution of insurance recoveries among the parties requiring insurance with respect to a single reactor, may properly be solved by negotiation between and among participants in the atomic energy effort and the insurance companies. Therefore, any legislative remedy for this problem should apply to liability in excess of reasonably available private insurance coverage.

Because reactors vary so widely in their size, design, safety characteristics, and potential for damage in the event of accident, it would appear undesirable to adopt legislation which sets as the basis for Government coverage of liability a uniform requirement as to amount and kind of private insurance. It is to be assumed that the insurance industry will review each reactor as a separate case and arrive at varying conclusions as to amounts of insurance and premium rates.

Therefore, it would appear advisable to grant to the Atomic Energy Commission discretionary authority to determine with respect to each reactor installation what is reasonable private insurance. By adopting such a case-to-case approach, there should be eliminated the problems of rigid legislation which might not be as applicable to a small research reactor as to a large breeder power reactor, or vice versa.

General legislative criteria should be provided to guide the AEC in its determination of the reasonable amount of insurance. These criteria might be stated in terms of the factors to be considered in making the determination. Among the most important factors, premium costs, as well as the amount of insurance available, should be considered in determining the reasonableness of private insurance coverage. Also to be considered is the factor of whether the insurance which may be available to a reactor operator also covers adequately the suppliers of reactor equipment and components.

I also support the suggestion that when the Atomic Energy Commission has made a determination as to what is reasonable private insurance for a given installation, a Government indemnification be afforded to the reactor operator and equipment and component suppliers for all third-party liability in excess of the private insurance coverage, up to a certain maximum amount. I am not qualified to make any recommendations as to what this maximum amount of Governent indemnification should be, but it should be kept in mind that the purpose of such indemnification is to provide for extraordinary, albeit unlikely, eventualities.

If the policy determination is made that it is in the public interest to encourage swifter development of a private atomic energy industry by reducing the burden of liability for an accident of drastic consequences but of very unlikely occurrence and if it is determined that there should be a maximum on the Government's indemnification, full implementation of that policy determination will require a limitation on liability to the sum of the insurance coverage plus the Government indemnification.

Lastly, if any program of Government indemnification is adopted, I think section 53 (e) (8) of the Atomic Energy Act should be amended,

A requirement that licensees of special nuclear material hold the Government harmless for any damages resulting from the use or possession of such material appears inconsistent with the theory of Government indemnification for extraordinary risks. Therefore, if the counter-indemnification by the licensee is to be retained, it should be limited to the amount of insurance found to be reasonable pursuant to the new legislation.

Senator GORE. The committee appreciates your appearance and thanks you, sir.

I think a staff member wishes to ask a question.

Mr. RAMEY. On page 11 of your statement you indicated that a flexible case-by-case approach should be followed by the Atomic Energy Commission in establishing the amount of insurance which should be required as a condition of a license, including taking into account the premium rates that might be proposed for varying amounts of insurance. Do you wish to comment further in this approach in relation to the various legislative proposals before the committee?

Mr. STEVENS. That is the theory of the bill, as I recall it, which was introduced by Representative Price, in which he had a provision that the determination should be made by the AEC.

What I am afraid of is this: If you limit the insurance to the amount available, say $65 million, as is stated in the proposed bill of the AEC, then you lack the flexibility in evaluation of hazards which was pointed out here, I think, by the representative of the Nebraska Cooperative, where you may have a reactor in one part of the United States where the population is very small, as compared with a reactor outside of Chicago or New York.

Also, unless you approach it on a case-by-case basis, do you not run the risk of penalizing the small reactor owner? Do you not penalize the REA people, and do you not penalize a whole lot of people in that category who cannot afford to take out all of the insurance that is available, as is stated in the AEC bill?

In other words, the language here of the AEC bill, is "such liability generally available in the open market." That might be $60 or $65 or $75 million.

Does that answer your question?

Mr. RAMEY. Yes. Do you have any other comments on the AEC proposal?

Mr. STEVENS. I have not had an opportunity to make a very careful study of it, but it seems to me that as I read it it is drawn more or less from the standpoint of the operator. It is not drawn in such a way that the component manufacturer or the supplier has very much of anything to say about the insurance that is taken out.

In other words, if the reactor operator wants a certain amount, there is no provision that if the component manufacturer is dissatisfied with that amount he can go beyond that. In other words, the 169 (1) indemnity reads:

> The Commmission is authorized at any time within 10 years from the date of the enactment of this Act to enter into an agreement with any holder of a permit or license for the construction or operation of a production facility.

It looks as if the control of the amount of insurance to be taken out is in the holder of that license. I think you want to give considera-

tion to the people who are engaged in the design, erection, and supply of components and so on.

I may have read the act too hastily in that connection.

Also, I have already commented on the question of the amount of insurance available. I am not quite sure, Mr. Ramey, that the section J on the last page of the AEC draft with respect to section 53 (e) (8) is entirely clear. You will find that on the last page of my statement I suggested that if counterindemnification by the licensees is to be retained, it should be limited to the amount of insurance found to be reasonable pursuant to the new legislation. That is on the theory that the amount of insurance is to be fixed by somebody such as the AEC.

Senator GORE. That is the Atomic Energy Commission draft that you are referring to, or their suggested draft?

Mr. STEVENS. It is, Senator Gore, and I was referring to the last page of that draft bill, subparagraph J. I am a little troubled also about this question of this definition of gross negligence. That is going pretty far, but I would rather not comment on that at this time. There has been excluded here loss or damage caused by bad faith, willful misconduct, or gross negligence.

Mr. RAMEY. The joint committee staff is preparing another draft bill that takes a somewhat different approach.

Mr. STEVENS. I have not seen the joint committee's draft. Is that available to the public yet?

Mr. RAMEY. It will be shortly; yes, sir.

Senator GORE. We will have a copy here within the next few days.

Mr. STEVENS. Those are the only comments that I have at the moment on that bill.

Senator GORE. The committee thanks you very much for your contribution.

Mr. STEVENS. Thank you very much.

Senator GORE. The next witness is Mr. Andrew J. Biemiller, legislative representative of the American Federation of Labor and the Congress of Industrial Organizations.

STATEMENT OF ANDREW J. BIEMILLER, LEGISLATIVE REPRESENTATIVE OF THE AMERICAN FEDERATION OF LABOR AND CONGRESS OF INDUSTRIAL ORGANIZATIONS; ACCOMPANIED BY LEO GOODMAN, OF THE RESEARCH DEPARTMENT, AFL–CIO

Mr. BIEMILLER. Mr. Chairman, for the record, my name is Andrew J. Biemiller, and I am a legislative representative for the American Federation of Labor and Congress of Industrial Organizations, with offices at 815 16th Street NW., Washington, D. C. I am accompanied by Leo Goodman of our research department.

The subject of today's hearing is one of utmost importance to organized labor. Just last week many representatives of our organization participated here in Washington, in the President's Conference on Occupational Safety. At this Conference the AFL–CIO's position was stated by Secretary-Treasurer William Schnitzler. He stressed the important role unions could play in a campaign to reduce industrial accidents and improve the record of occupational accidents and industrial safety. He noted that unions are frequently ignored in these campaigns. The fact is that we are here today primarily be-

cause of the annual toll of 14,000 dead and nearly 2 million injured as the result of industrial accidents. Admiral Strauss also addressed that Conference and in his comments, in our judgment, painted too rosy a picture of the safety precautions and the low level of accidents associated with the nuclear-science industries.

Mr. Chairman, we in organized labor have had some experience with the actual developments in this industry, and we do not feel the picture is as rosy as has been portrayed here and elsewhere, nor are the remedies proposed here adequate to meet the realities of the situation.

In this field of protection from hazard, organized labor has an obligation not only to its own membership in atomic installations, but also to the general public in the community, families of workers in the plants, their relatives, and friends. Insofar as we are able, we shall insist upon the kind of protection which will minimize the possibility of harmful effects resulting from the development of nuclear science.

In the background materials submitted with the McKinney panel report, on page 503, Mr. Chairman, the members of the labor seminar stated the criteria which they recommended to the McKinney panel in regard to health and safety. Mr. Chairman, I ask that that section be inserted in my remarks at this point.

Senator GORE. Without objection, that will be included at this point.

(The information referred to follows:)

HEALTH AND SAFETY

The peculiar nature of radiation makes health and safety a prime concern of peaceful atomic development. We must assure that such development proceeds on the basis of thorough, effective control of radiation hazards.

Unfortunately, there is a danger that the apparent good safety record at atomic energy installations may lull many into an unwise sense of security. The need for strict observance of necessary health and safety standards is actually increasing, both because radioactive equipment and substances are being used more widely and because such use is increasing by persons who may not be as aware of or as competent to handle the dangers of radiation as atomic specialists.

We must never lose sight of the fact that radiation cannot be detected by a man's senses, so that the danger of exposure is not immediately apparent. Injury also may not be evident until a considerable period after unsafe exposure. Moreover, exposure may shorten life or produce genetic damage even though there is no apparent injury.

Conscientious expert precautions are therefore necessary for the safety and health of the general public. Additional safeguards are of course required for those who work with or near sources of radiation. Radiation hazards are largely beyond the control of the individual workman, who cannot avoid risk merely by exercising reasonable care as in the case of most other industrial hazards.

Various positive safeguards are required where radiation is employed: Protective equipment and shielding, regular and thorough checks on the amount of radiation present, detailed records of exposure, and specialized safety information and training programs are among the special needs. No skimping should be permitted on such protective measures.

The Federal Government must carry the responsibility for establishing and enforcing the minimum standards required for nuclear reactors and radioisotope handling to assure the maintenance of public and worker health and safety.

The Atomic Energy Commission should also incorporate the required health and safety regulations directly into its licenses to insure that complete observance is a basic condition of continued reactor operation or of use of radioisotopes. The regulations should be enforced through cancellation of licenses where operators do not adhere fully to the regulations.

This is an area in which the different States generally lack the resources of technically competent personnel required to enact and enforce fully adequate health and safety regulations. Where States do adopt a code covering all types of radiation hazards which meets Federal minimum standards for health and

safety, they should be given grants-in-aid to help provide the trained personnel necessary to carry through complete inspection and enforcement.

Special brief comments appear in order on the allowable amount of radiation exposure. There appears to be some ground for believing that the present maximum permissible exposure as recommended by the National Committee of Radiation Protection of 0.3 roentgen per week is excessive.

A special report presented at the Nuclear Engineering and Science Congress in Cleveland in December 1955 by Professor Whipple stated that such exposure "has a small but significant risk for a lifetime occupational exposure. It is strongly recommended that a figure no greater than one-tenth of this be taken as a criterion for a nuclear powerplant. Proper regard for the control of radiation hazards in the plant design will reduce the risks to employees and will also reduce operating costs."

In considering the advisability of a more restrictive criterion, it may be advisable to give added weight to the fact that the exposure during work hours may be supplemented by occasional further exposure after hours, especially as radioactive materials come into wider use. While the worktime exposure may be within a safety limit, the combination with other exposure might in some instances reach dangerous proportions.

Part of the radiation danger stems from the cumulative effect of continued or repeated exposure. It appears highly desirable, particularly in light of the uncertain extent of possible carryover of injury to future generations, to limit the time in which atomic energy workers are exposed by establishing shorter hours of work and longer vacation periods.

The model code prepared by the International Labor Organization in 1949 recommended for workers exposed to radiation a 35-hour week with at least a 4-week annual vacation, together with 3 months away in some other work once in every 15-month period.

It is also important that each worker be given a copy of the tally sheet recording his exposure, both to help provide an additional check on adherence to the limitations and to help maintain worker awareness of the hazard.

Finally, top priority should be given to the need for provisions for equitable compensation for workmen who do suffer injury or illness from the effects of radiation. Existing State workmen's compensation legislation laws are largely inadequate for this purpose, since they have been developed without regard to the peculiar problems of radiation injury.

This need should be met as early as possible through Federal legislation or powers provided under the AEC's licensing authority.

Such compensation legislation explicitly covering radiation damage should not contain a statute of limitations, inasmuch as radiation injury and the nature and extent of its effect may not be evident for a considerable time after exposure. Restrictive statutes of limitations included in State laws have not been designed with this problem in mind and should not be applied to prevent valid claims for compensation for radiation injury where damage has not come to light until years later.

In the same way, limitations on medical benefits should be waived for radiation injury. There is no adequate basis for determining equitable limits and the paramount concern should be to provide victims of radiation injury with all necessary medical attention.

Mr. BIEMILLER. The McKinney panel adopted some of labor's recommendations. On page 128 of the McKinney panel report they urged the Commission to step up its program of research into—

* * * the causes, effects, and control of atomic hazards * * * in order that both those concerned with protection against harmful levels of radiation and those concerned with providing insurance to cover such damage * * *

Mr. Chairman, we of organized labor find ourselves vitally concerned in both aspects. The various proposals pending before this committee make us apprehensive that insufficient consideration has been given to the problems which lie ahead. A number of witnesses have appeared here before the committee including some who participated in an executive advisory seminar back in March, advocating adoption of Federal residual insurance as a condition for progress by private

enterprise in the atomic power field. Shortly after that meeting the members of Local 301, IUE–AFL–CIO. The Knolls Laboratory in Schenectady, N. Y., held a fifth memorial to the first worker who died in the atomic-power industry. I would like to introduce into the record a circular issued by local 301 at the time of Joe Stevens' death. The circular is headed "Joe Stevens Did Not Have to Die." The circular ends with the appeal that Joe Stevens' fellow workers contribute to a fund to help meet the expenses for Joe Stevens' unborn child, which was born the summer of 1951.

(The document referred to follows:)

JOE STEVENS DID NOT HAVE TO DIE[1]

Workers at the Knolls Atomic Power Laboratory are mourning today the death of their brother, Joseph A. Stevens.

But Joe Stevens did not have to die. He could have continued working, helping to produce the goods to defend our Nation and our way of life.

Joe Stevens was working alone at the time the fresh air supply was cut off. Atomic Energy Local 301, IEU–CIO, demanded in local negotiations that no man be required to work alone.

Joe Stevens died when the oxygen being sent to him was replaced by nitrogen. Atomic Energy Local 301 has demanded many times a change in the fresh-air supply system, so that such a tragedy as this would not take place.

Joe Stevens' death has been called an accident. Atomic Energy Local 301 demanded in local renegotiations that a safety committee be established to prevent such "accidents" from taking place.

The tragedy of Joe Stevens' death causes all of us to examine the conditions under which we work. We perform operations which are exclusive in atomic-power laboratories. The material on which we work is still in the early stages of experimentation. We deserve a maximum amount of protection against accidents, illness, and death.

It is to be regretted that a maximum amount of protection did not exist before Joe Stevens died. It is tragic that a man had to die to point up the need for such protection.

Joe Stevens would want us to continue our fight to see that a reoccurrence is avoided.

Atomic energy workers so far have been generous in their gifts to Mrs. Joseph Stevens, who is expecting a child this summer. If you have not yet contributed, do so as a tribute to your fellow worker.

Those who wish to pay their last respects are reminded that services will be held at 9 a. m., Wednesday morning, at St. John the Baptist Church, Amsterdam.

Mr. BIEMILLER. Mr. Chairman, the problem that is new in regard to workmen's compensation, disability insurance, medical care, and unemployment insurance in this new industry is that exposure to physically harmful radiation can take place and the individual, whether single or the whole community which has been affected, may not even know it. We were surprised, therefor, Mr. Chairman, when we noted the establishment of the committee of lawyers, whose purpose it was to formulate a statute of limitations for claims to be filed subsequent to exposure. Chairman Anderson pointed out in his remarks to the northeastern regional meeting of the American Bar Association, in April, that the Supreme Court ruling in *MacPherson* v. *Buick Co.* prevails today. So the lawyers for the insurance industry come before this committee and recommend a Federal assumption of residual risk on a limited basis, with the recommendation that there be a limitation of amount with human life valued at $25,000 to and I quote:

[1] Issued by Local 301, IEU–CIO Atomic Energy Workers.

Serve as a brake on runaway juries which might sometimes be as great a threat to the new industry as the runaway reactor.

I can understand the necessity of trying to limit by Federal statute the amoiunt of awards for injury because only last month the Aetna Casualty & Security Co. settled out of court 7 of a series of 8 personal injury claims at the Y–12 plant in Oak Ridge. Mr. John W. Henderson of Chesnee, S. C., who suffered permanent blindness and a fractured collarbone, received a settlement of $75,000. This settlement resulted from an explosion which the AEC has hushed up.

The local newspaper in Oak Ridge has editorially called for more information regarding accidents so that they could be avoided rather than the application of the security clamp which leaves doubt, fear, and ignorance as to how to avoid their recurrence prevalent in the community. Last week the Y–12 plant had another explosion; this time the facts were admitted and it is revealed that zirconium oxide stored in the scrap pile "just went boom." William Stooksbury of Andersonville, was killed and two other workers seriously injured.

Mr. Chairman, while the Cole bill and the Price bill propose Federal assumption of residual risk, the AEC has sponsored a series of meeting with State officials which have brought some thinking regarding health and safety around to the point where there is pending before this committee H. R. 8676, which states, and I quote (line 11):

Whenever the Commission receives from the Governor of any State a certificate to the effect that the State has an agency competent to exercise jurisdiction in any portion of the health and safety aspects of the Atomic Energy Commission, then the Commission is directed, on the day 6 months after the date of the receipt of that certificate, to relinquish the jurisdiction of health and safety in the area specified in the certificate.

It seems to us, Mr. Chairman, that it is highly inconsistent to have the Federal Government assume the risk while consideration is being given to handing over control of the standards to the States on the say-so of the Governor. Mr. Chairman, this question should not be acted on too hastily. We are dealing here in the future with many unknowns. New diseases formerly unheard of are being created by this industry. New legal problems, as the chairman has pointed out, face us in the future. Many developments will occur which we cannot possibly imagine in this room. There is no need for undue haste on this aspect of the program. One of our affiliated organizations, the International Association of Machinists, is still trying to get redress for a member.

Arthur L. Cardwell, employed at Oak Ridge in 1945 and required to handle beryllium with his bare hands, became infected with what was later diagnosed as beryllium poisoning. No precautionary measures were taken by the contractor until April 1948. The gradual course of the disease has brought Mr. Cardwell to a continually deteriorating condition in the hospital, without funds, and his savings completely exhausted. Because he accepted a $4,000 payment from the employer's insurance carrier, the AEC wipes its hands of the case, and on January 25 of this year advised President Hayes:

It does not appear that Mr. Cardwell's situation is one which would warrant further study or action by this office.

The AEC always minimizes the impact of any accident but the workers in Oak Ridge know that the Arco reactor blew up, and I quote from the Oak Ridger of April 10, 1956:

Rather than a wrong button or a misunderstanding (the Argonne spokesman) describes what happened as "split second indecision" or "underestimation of the necessary shutdown time."

Here at Fort Belvoir where the most penetrating type of emission from radiation, gamma rays, were—

left unshielded for about 3 hours * * * contrary to standard practice * * * the AEC says the men who were exposed are unharmed.

Yet just this morning's paper raises a considerable doubt in this respect of a person involved who has died.

Mr. Chairman, there is a great deal of controversy regarding the level of safe exposure. I am sure this committee is familiar with the point of view of Prof. G. Hoyt Whipple, of the University of Rochester, that the present exposure standard of 0.3 roentgen per week be reduced to—

a figure no greater than one-tenth of this as the criterion for nuclear powerplants.

Organized labor has sought the facts regarding hazards in this industry. Five years ago my colleague, Mr. Goodman, asked the AEC to establish a training course on safety and hazard problems. The request was refused. But the papers released at Geneva, particularly that of the ILO entitled "Protection of Workers Against Ionizing Radiation," pointed up the seriousness of the high permissive level of exposure which has been permitted in the United States. As we pointed out in the Labor Seminar Report, exposure is cumulative and the level of exposure may be exceeded by excessive X-rays following accident or other medical treatment procedures. We recommended, therefore, for the protection of the human race itself as well as the individual workers involved, the establishment of the highest standards of protection—a shorter workweek, longer vacations, and rotation of workers from jobs where high levels of exposure are likely. In addition, each worker should have a copy of his own tally sheet regarding his total exposure for life. Existing compensation legislation and restrictive statutes of limitations not designed to deal with this whole problem should be reviewed by comprehensive study with adequate representation of the affected unions involved given an opportunity to participate and help formulate the new standards which are needed.

I do not pose at length the even greater problems which are raised by such presentations as that of Senator Welker on the floor of the Senate March 20 in regard to the whole problem of location of atomic installations in relation to their proximities to centers of population, nor the equally serious problem being studied in connection with the investigation of civilian defense of what happened when an industrial power reactor becomes a potential military target.

In summary, Mr. Chairman, we renew our constant plea that the time is ripe for the AEC to break down some of the, to us, false standards of secrecy with which they surround accidents and similar problems.

Second, get into consultation with the representatives of the workers who are involved in these plants and who are constantly worried about their safety. We have made efforts at local levels, and we have made efforts here nationally, and to date we are finding rather a closed door.

I renew the request that a thorough study be made of the problems arising in the field of workmen's compensation laws as they are going to be affected by the development of the atomic industry.

We thank you for the opportunity to appear here this morning.

Senator GORE. The committee thanks you, Mr. Biemiller, for a very provocative statement.

Senator JACKSON. It was a very fine statement, Mr. Biemiller. I have just one question.

Are the contractors unwilling to get together, or is it the AEC, or both? What is the difficulty? Where does it lie in your judgment?

Mr. BIEMILLER. It is in some instances a combination of both. We start out by pointing out that the AEC has turned down a request for a training course that we made 5 years ago. Second, we point out that while we, from time to time, have been able to dig out certain information from the AEC we have to go down and dig it out. There is no attempt being made as far as we can see by the AEC to make pertinent information available.

Senator JACKSON. Have you renewed your request for the training course?

Mr. BIEMILLER. In local situations it has been renewed. We have not renewed it at a national level recently. We are in the process of formulating certain proposals that we are going to make. As far as contractors are concerned, in some instances they lean backward on the secrecy policy of the AEC, and in other places we think they are just plain refusing to cooperate. This is not true only on safety programs as we point out in the document that I asked to have inserted. It is true on training programs. It is true on matters of upgrading of workers. We have had situations where contractors have refused to discuss why worker A rather than worker B is upgraded on the grounds that secrecy is involved. It is this kind of a situation that is provoking some very bad situations in labor relations. I am sorry I have gotten a little afield from your question but it is something that we feel very strongly.

Senator JACKSON. That is all.

Senator GORE. Thank you very much, Mr. Biemiller.

This concludes the hearing on the insurance phase of the problem of the current study by the Commission. There will be an executive session held this afternoon and tomorrow, and a public session will be held on Wednesday morning, on pending legislation proposing the erection and authorization of Government power reactors.

The committee stands adjourned.

(Whereupon the committee recessed at 11:05 a. m., Monday, May 21, 1956, until Thursday, June 14, 1956, at 10 a. m.)

GOVERNMENTAL INDEMNITY

THURSDAY, JUNE 14, 1956

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The joint committee met, pursuant to call, at 10:15 a. m., in the Old Supreme Court Chamber of the Capitol, Hon. Melvin Price presiding.

Present: Representatives Price, Kilday, and Van Zandt.

Also present: George Norris, Jr., committee counsel.

Representative PRICE. The committee will be in order.

The hearing this morning is to receive testimony on Senate bill 3929, introduced by Senator Anderson, its companion identical bill in the House, H. R. 11523, which I introduced, and H. R. 11242, introduced by Mr. Cole, providing for governmental indemnity against reactor hazards to the public.

Without objection, S. 3929 and H. R. 11242 will be included in the record at this point.

(S. 3929 and H. R. 11242 follow:)

[S. 3929, 84th Cong., 2d sess.]

A BILL To amend the Atomic Energy Act of 1954, as amended, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 2 of the Atomic Energy Act of 1954, as amended, is amended by adding a new subsection to read as follows:

"i. In order to encourage the development and operation of production or utilization facilities, the United States may assume liability for a portion of the damages suffered by the public in connection with the design, construction, or operation of such facilities, and may limit the liability of those persons responsible for such losses."

SEC. 2. Subsection 53 e. (8) of the Atomic Energy Act of 1954, as amended, is amended to read as follows:

"(8) except to the extent that the United States shall have granted indemnity as provided in section 170 of this Act, the licensee will hold the United States and the Commission harmless from any damages resulting from the use or possession of special nuclear material by the licensee."

SEC. 3. The Atomic Energy Act of 1954, as amended, is amended by adding thereto a new section, with the appropriate amendment to the table of contents:

"SEC. 170. INDEMNIFICATION AND LIMITATION OF LIABILITY.—

"a. Each license for the operation, possession, or use of a production or utilization facility shall have as a condition of the license a requirement that the licensee have financial protection of such a type and in such amounts as the Commission shall determine to be reasonably adequate to cover public liability claims arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or by-product materials used in or resulting from the construction or operation of the facility. Such financial protection may include private insurance, private contractual indemnities, self insurance, or a combination of such measures.

"b. In determining the amount of financial protection to be required, the Commission shall take into consideration the following: (1) the total amount of insurance available from private sources, (2) the cost of such insurance, (3) the type, size, and location of facility involved, and (4) the type of ownership of the facility, whether the ownership is (a) private, (b) public, (c) profitmaking, or (d) nonprofit.

"c. The Commission shall, until August 1, 1966, agree to indemnity and hold harmless the owner, operator, manufacturer, designer, or builder of a production or utilization facility and each supplier of equipment, material, or services for such facility, as their interests may appear, in the event of claims arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or by product materials used in or resulting from the construction or operation of the facility constructed or operated under license from the Commission, against that liability to members of the public for bodily injury or death or property damage, including loss of use, which is in excess of the amount of financial protection required, but not to exceed $500,000,000 in the aggregate for each facility within the United States and for each incident. The Commission shall execute such a contract of indemnification with the licensee, covering the liability of all indemnities arising out of, or resulting from, the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the construction or operation of the facility because of activities of the indemnitee during the period of the license.

"d. In addition to any other authority the Commission may have, the Commission is authorized until August 1, 1966, to enter into agreements of indemnification with its contractors for the construction or operation of production or utilization facilities for the benefit of the United States, in which the Commission may require its contractor to provide financial protection of such a type and in such amounts as the Commission shall determine to be reasonably adequate to cover public liability claims arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the construction or operation of the facility because of activities of the indemnitee during the period of the contract and to indemnify the contractor against such claims for such sums above the amount of the financial protection required, but not in excess of $500,000,000. Such agreements shall be for activities performed within the terms of the contract and shall include the liability of subcontractors and suppliers and be applicable to lump sum as well as cost-type contracts and to contracts financed in whole or in part by the Commission.

"e. The owner, constructor, or operator of a production or utilization facility and all other parties set forth in subsections c. and d. above shall not be liable for damages arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the construction or operation of the facility in an aggregate amount of more than the amount of the financial protection required by the Commission to be obtained, together with the sums set forth in subsections c. and d. above, and any other sums which may be made available by the Congress for the payment of such damages. In the event that such damages exceed this aggregate sum, any indemnity may apply to the appropriate District Court of the United States having venue in bankruptcy matters over the location of the facility, for an order limiting the liability of all indemnities, including all contractors and subcontractors in accordance with the provisions of this section, and for further orders, as appropriate, apportioning the payments to be made to such claimants upon appropriate proof of damage and permitting partial payments to be made before final determination of the total claims.

"f. The Commission is authorized to charge for the right of indemnification given by this section to licensees of production and utilization facilities. This charge shall be $10,000 per year for facilities licensed under section 103. For facilities licensed under section 104, the Commission is authorized to reduce the charge set forth above, taking into consideration: (1) the type and location of facility involved, (2) the amount and type of fuel, (3) the purpose for which the facility is built, and (4) the ownership of the facility, whether (a) private, (b) public, (c) profitmaking, or (d) nonprofit. All

sums collected by the Commission pursuant to this subsection shall be made a part of and be merged with appropriations to be used by the Commission for research and development.

"g. In the administration of indemnity agreements entered into hereunder, the Commission shall use, to the maximum extent practicable, the facilities and services of private insurance companies and established insurance adjustment organizations and the Commission may contract to pay a reasonable compensation for such services. Any contract made under the provisions of this subsection may be made without regard to the provisions of section 3709 of the Revised Statutes, as amended, upon a showing by the Commission that advertising is not reasonably practicable.

"h. Where it appears that there may be damages arising out of any incident for which the United States shall be required to make an indemnification under this section, the Commission shall be authorized in the agreement of indemnification to approve the payment of any claim and to appear through the Attorney General on behalf of the indemnitee in any action and to settle or defend any such litigation or claim and to represent the indemnitee in or take charge of any such proceedings. The Commission shall have authority to settle or approve the settlement of claims without regard to the rules of legal liability in the State of the accident, and regardless of whether liability has been established by the judgment of any court.

"i. After any incident which may require payments by the United States under this section, the Commission shall make a survey of the causes and extent of damage which shall forthwith be reported to the Joint Committee. Such reports shall also be made available, to the extent that the provisions of chapter 12 or any other law or executive order permit, to the public, to the parties involved and to the courts. The Commission shall report to the Joint Committee every three years on the operations under this section.

"j. The Commission, in administering this section, may make contracts in advance of appropriations and incur obligations without regard to section 3679 of the Revised Statutes, and any appropriations presently or hereafter made available to the Commission shall be available for the payment of obligations under indemnity agreements entered into under this section."

[H. R. 11242, 84th Cong., 2d sess.]

A BILL To amend chapter 14 of the Atomic Energy Act of 1954

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That chapter 14 of the Atomic Energy Act of 1954 is amended by adding thereto a new section to be known as section 169–1, with appropriate listing to be made in the Act's table of contents, and to read as follows:

SEC. 169–1. INDEMNITY.—

a. The Commission is authorized, at any time within ten years from the date of enactment of this Act, to enter into an agreement with any holder of a permit or license (except those issued to another Government agency) for the construction or operation of any production or utilization facility within the United States to indemnify and hold harmless such permittee or licensee and any owner, operator, manufacturer, designer or builder of such facility or any part thereof and any supplier of equipment, material or services for such facility against liability to persons (including employees and agents of the Commission) for death, bodily injury and property damage, including loss of use. Each such indemnity agreement may be issued for the full term of the permit or license and shall be subject to the following conditions:

(1) The Government shall have no obligation under the indemnity agreement for liability to persons indemnified under such agreement.

(2) The Government shall have no obligation under the indemnity agreement for claims of employees of persons indemnified which arise under State or Federal Workmen's Compensation Acts.

(3) The liability covered shall be only that which is in excess of the amount of non-governmental insurance against such liability generally available on the open market as determined by the Commission from time to time, such determination to take affect on the next anniversary date of the indemnity agreement.

(4) The liability covered shall include only that which arises out of or results from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the construction or operation of the facility.

(5) The liability covered shall be limited to that which results from occurrences during the effective term of a permit or license authorizing the construction or operation of such facility.

(6) The Government shall have no obligation under the indemnity agreement for loss or damage caused by bad faith, willful misconduct or gross negligence on the part of the person indemnified (if such person is not a corporation) or any corporate officer or officers of the person indemnified (if such person is a corporation) or on the part of a plant manager, plant superintendent, or equivalent representative of the person indemnified.

b. The Commission shall make an annual charge for indemnity coverage at such rates as it deems reasonable after taking into consideration (1) the scale of premiums charged or which would be charged by private insurance companies for public-liability coverage of the facility involved, and (2) the objective of establishing rates which will not tend to discourage widespread participation in the development and utilization of atomic energy for peaceful purposes. Such rates shall be established for each increment of indemnity coverage as determined by the Commission. The basis for such rates shall be incorporated in a schedule which shall be published by the Commission.

c. The Commission is also authorized, at any time within ten years from the date of enactment of this section, to enter into agreements with private insurance companies reinsuring such companies for insurance coverage provided by them to any holder of a permit or license (except those issued to another Government agency) for the construction or operation of any production or utilization facility within the United States and any owner, operator, manufacturer, designer, and builder of such facility and any supplier of equipment, material or services for such facility against liability to persons for death, bodily injury and property damage, including loss of use. Each such agreement of reinsurance shall be subject to the conditions specified in subsection *a* of this section with respect to agreement of indemnity. The Commission shall make a charge for such reinsurance coverage, at such rates as it deems reasonable after taking into consideration the scale of premiums to be charged by such private insurance companies for the coverage which is so reinsured.

d. Each indemnity and reinsurance agreement shall be in writing and shall take effect upon its execution. It shall include such terms and conditions, not inconsistent with this section, as the Commission deems appropriate.

e. There is hereby established a Federal Atomic Hazard Indemnity Fund for use by the Commission in carrying out the functions authorized by this section. The net proceeds derived by the Commission from indemnity fees and reinsurance premiums collected under subsections (b) and (c) shall be deposited in the Federal Atomic Hazard Indemnity Fund. Moneys in the fund not needed for current operations of the Commission under this section may be invested or reinvested by the Commission, with the advice of the Secretary of the Treasury, in all obligations which are lawful investments for fiduciary, trust, or public funds of the United States.

f. In order to finance activities under this section, the Commission is authorized to issue to the Secretary of the Treasury, from time to time, notes or other obligations in amount not exceeding $500,000,000 outstanding at any time. Such notes or other obligations shall be in such forms and denominations, have such maturities, and be subject to such terms and conditions, as may be prescribed by the Commission with the approval of the Secretary of the Treasury. The Secretary of the Treasury is authorized and directed to purchase any notes or other obligations of the Commission to be issued hereunder and for such purposes the Secretary of the Treasury is authorized to use as a public debt transaction the proceeds from the sales of any securities issued under the Second Liberty Bond Act, as amended, and the purposes for which securities may be issued under such Act, as amended, are extended to include any purchase of such notes or obligations. The Secretary of the Treasury may at any time sell any of the obligations acquired by him under this section. All redemptions, purchases, and sales by the Secretary of the Treasury of such obligations shall be treated as public debt transactions of the United States.

g. Moneys in the Federal Atomic Hazard Indemnity Fund may be used for the following purposes as deemed necessary by the Commission: (1) to pay approved claims under indemnity contracts and reinsurance agreements and other expenses incurred under this section, and (2) to pay to the Secretary of the Treasury sums borrowed from him, with interest, in accordance with the provisions of subsection (f).

h. In the performance of its functions under this section, the Commission may determine the character of and the necessity for its obligations and expenditures, and the manner in which they shall be incurred, allowed, and paid, subject to the provisions of law specifically applicable to Government corporations.

i. The provisions of the Government Corporation Control Act, as amended, shall apply to the functions vested in the Commission in this section, to the same extent as applicable to wholly-owned corporations.

j. The provisions of section 53.e (8) shall not apply to the liability assumed by the Government under indemnity or reinsurance agreements executed pursuant to the authority of this section.

k. In the administration of indemnity and reinsurance agreements entered into hereunder, the Commissioner shall use, to the maximum extent practicable, the facilities and services of private insurance companies and of established insurance agents and brokers and established insurance adjustment organizations, and the Commission may contract to pay a reasonable compensation for such services. Any contract made under the provisions of this subsection may be made without regard to the provisions of section 3709 of the Revised Statutes, as amended, upon a showing by the Commission that advertising is not reasonably practicable.

l. Nothing in this section shall be construed to except any real property, acquired and held by the Commission in connection with the payment of any claim under this section, from taxation by any State or political subdivision thereof, to the same extent, according to its value, as other real property is taxed.

m. The Commission shall, not later than one year after the passage of this section and annually thereafter submit to the President and to the Congress a report of activities under this section, including therein such recommendations as may be deemed advisable.

Representative PRICE. The first witness this morning will be Commissioner Harold S. Vance of the Atomic Energy Commission. Mr. Vance, would you proceed with your statement please.

STATEMENTS OF HAROLD S. VANCE, COMMISSIONER, ATOMIC ENERGY COMMISSION; AND WILLIAM MITCHELL, GENERAL COUNSEL, ATOMIC ENERGY COMMISSION

Mr. VANCE. Mr. Chairman and members of the committee, from May 15 to 21, 1956, the Joint Committee on Atomic Energy held hearings on the need for legislation to provide adequate protection to operators of nuclear powerplants and other production and utilization facilities, and their suppliers, against liability arising out of a nuclear accident. The Atomic Energy Commission, in the course of its testimony, submitted to the Joint Committee a draft bill which has since been introduced by Congressman Cole as H. R. 11242. Other participants at the hearings included representatives of insurance companies, power producers (both privately and publicly owned), and equipment manufacturers.

The central fact which emerged from those hearings was a striking unanimity of opinion that the liability insurance expected to be available from the insurance industry will not provide adequate protection to the public against the possibility of catastrophic accidents, remote though that contingency may be, and that legislation is needed

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promptly to remove the deterrent effect which limited insurance protection will have on development of the nuclear power industry.

The two bills which the committee is considering today—H. R. 11242 and S. 3929, the bill prepared by the Joint Committee staff and introduced by Senator Anderson—both have the removal of this deterrent as their principal objective. Although the approach embodied in S. 3929 differs somewhat from that incorporated in H. R. 11242, we believe that legislation of the type suggested in S. 3929 would meet the problem to which both bills are directed, and could be administered in a practical and workable manner.

H. R. 11242, the bill submitted by the Atomic Energy Commission, would authorize the Commission to issue indemnity agreements directly to holders of construction permits and to licensees and their suppliers and to enter into reinsurance agreements with insurance companies. It would provide that the protection offered by such indemnity agreements or reinsurance agreements apply only to losses in excess of amounts of liability insurance determined by the Commission to be available commercially. The bill would not place a top limit on the amount of the indemnity or the reinsurance, but would leave the amount in each case to be determined by the amount that the licensee is willing to buy. The charge for such protection would be based on a schedule of charges to be developed by the Commission.

The Commission's reasons for recommending the type of indemnity program incorporated in its bill were stated in some detail by AEC representatives at the hearings on May 15. We still believe the following desirable and urge that the committee consider them:

1. A reinsurance program which would permit the Commission to enter into agreements with private insurance companies reinsuring such companies for insurance coverage provided by them under situation more fully detailed in subsection c of H. R. 11242.

2. Establishing a fund for use by the Commission in carrying out an indemnity program; and

3. Providing that the provisions of the Government Corporation Control Act apply to the activities of the Commission in administering an indemnity program. The Commission deems the enactment of legislation, supplementing the financial protection otherwise available to licensees and their suppliers, as being most important to encourage independent activity in the development of nuclear power. If it is the sense of the committee that the type of program incorporated in S. 3929 is preferable to that which would be established in H. R. 11242, the Commission would have no objection. However, the Commission would prefer to see the suggestions which I have made this morning with respect to a reinsurance program, the establishing of a fund for use by the Commission in carrying out its indemnity program and the provisions of the Government Corporation Control Act incorporated therein.

If there are any questions regarding the Cole bill, Mr. Mitchell, our general counsel, will be happy to respond. However, because of time limitations his remarks will be confined, in the main, to a discussion of S. 3929, the bill drafted by the Joint Committee staff.

Representative PRICE. Specifically, Mr. Vance, what is the position of the Commission as regards to the three bills? Which is the most favorable as far as the Commission is concerned?

Mr. VANCE. I find some difficulty in giving you a categorical answer, Mr. Chairman, to that question for this reason: I frankly believe that the passing of some bill at this session of Congress is more desirable than the selection of a particular bill. On the assumption that a bill such as the bill prepared by the staff of the Joint Committee would have a better chance for passage at this session, then we are in favor of that bill and, as I said, we believe it is workable.

If, in the course of time, it develops that there are difficulties with the bill, at another session of Congress it could be amended. But if this session ends without some action on this subject, it will measurably delay what otherwise we believe would be desirable progress in this field.

Representative PRICE. The Commission then believes that passage of some bill having to do with setting up Government indemnity in this field is absolutely urgent and should be passed before the end of this session of Congress?

Mr. VANCE. Yes, sir.

Representative PRICE. Does the Commission feel without passage of some legislation at this session the industrial power reactor program will be seriously retarded and held back?

Mr. VANCE. It will be delayed; yes, sir.

Representative PRICE. Is Mr. Mitchell going to present a statement?

Mr. VANCE. Mr. Mitchell will discuss the provisions and the Senate bill.

Representative PRICE. He will give a detailed statement on the features of the various bills?

Mr. VANCE. Yes, sir.

Mr. MITCHELL. I will limit myself, Mr. Chairman, in my prepared statement to S. 3929, since we have already commented in some detail in previous hearings on the Commission bill which was introduced by Representative Cole. I will be glad to talk to the other bill afterward if the chairman cares to have me do so.

Representative PRICE. Will you proceed with your statement.

Mr. MITCHELL. Thank you, sir.

DETERMINATION OF FINANCIAL PROTECTION TO BE REQUIRED OF LICENSEES

Mr. Chairman and members of the committee, S. 3929 would require as a condition of "Each license for the operation, possession, or use of a production or utilization facility" that the licensee have financial protection of a type and in an amount determined by the Commission. The Commission has for some time had under consideration the desirability of amending its regulations to incorporate a similar requirement in its facility licensing regulation (pt. 50). We have no objection to the incorporation of such a requirement in the act.

The amount of financial protection required of licensees would be such as the Commission determines to be "reasonably adequate to cover public liability claims" from specified hazards (p. 2, lines 20–21). Although we believe it is clearly not intended, the phrase quoted might provide a basis for contention that the reasonableness of financial protection must be measured solely by its adequacy to cover potential liability. Those who might so contend, might also urge (again we believe contrary to the clear purpose of the provision)

that the type of ownership of the facility (whether public or private, profit making or nonprofit, as specified in lines 4–11 on page 3 of the bill) is relevant solely from the standpoint of whether the owner of the facility presently enjoys immunity from tort liability. We believe it is intended that the Commission should determine the reasonableness of financial protection to be independently supplied by the licensee in light of all circumstances which the Commission finds are significant; and that consideration of "type of ownership" is not intended to be confined to consideration of immunity from tort liability, but may include such matters as the ability of various types of licensees to provide independent financial protection. We have discussed with the committee staff some of the ways in which these provisions might be clarified.

In our earlier testimony we adverted to some of the difficulties involved in determining the point at which Government protection should become effective. However, in spite of these difficulties, we believe that it will be possible for the Commission to develop reasonable limits within which the licensees will be required to furnish financial protection. Although the bill specifies certain factors (subsec. b, p. 3) which the Commission is required to take into consideration in determining the amount of financial protection, the enumeration does not appear to be exclusive. The Commission, we believe, would have discretion to consider other relevant factors.

INDEMNIFICATION OF GOVERNMENT CONTRACTORS

Subsection d authorizes the Commission to enter into indemnity agreements with its contractors, for the protection of the contractors, their subcontractors and suppliers, against risks similar to those for which protection is provided to licensees and their suppliers. No such provision was included in H. R. 11242. We believe it is a desirable feature of the bill prepared by the committee staff.

It is noted that subsection d does not require the Commission to establish an amount of financial protection which contractors must supply. In the case of contractors, imposition of this requirement is left wholly to the discretion of the Commission. The flexibility of this provision we believe is important. The Commission, for example, would probably not want to require a typical cost-type contractor operating Commission-owned facilities to provide financial protection before the Government hold-harmless obligation becomes effective.

SETTLEMENT OF CLAIMS WITHOUT REGARD TO "RULES OF LEGAL LIABILITY"

Subsection h provides in part that:

> The Commission shall have authority to settle or approve the settlement of claims without regard to the rules of legal liability in the State of the accident, and regardless of whether liability has been established by the judgment of any court. (p. 7, lines 17–21)

This provision would seem to change the entire concept of the bill. The Government's obligation established in subsection c is to "indemnify and hold harmless * * * against * * * liability * * * for bodily injury or death or property damage." That obligation presupposes that the liability of the indemnitee will be established in

accordance with applicable rules of legal liability, including principles relating to responsibility, causation, measure of damages, and so forth. Such an indemnity would presumably be coextensive in scope with insurance coverage or other financial protection for the amount for which the licensee was financially responsible. The quoted sentence, however, would depart wholly from the concept of indemnity by authorizing the indemnitor to accept liability in circumstances in which the indemnitee was not liable. It is unclear how this would fit in with the principle that the Government's indemnity starts above the point to which the licensee provides financial protection.

In addition the provision may create further difficulty in view of the limitations on liability. The settlement of claims without regard to applicable laws may considerably dilute the protection offered those having valid claims, or it may deprive the "indemnitees" of the full benefit of the Government's obligation to hold them harmless. It may inject further uncertainty as to the constitutionality of the limitation upon liability and would seem to create considerable difficulty for district courts in proceedings provided for the subsection e.

On the other hand it is recognized that the law applicable to nuclear accidents is uncertain. Moreover, borderline cases with respect to legal liability are foreseeable. These uncertainties, we think, point to the desirability of giving the Commission final and conclusive authority to settle or approve the settlement of claims on such basis as it deems fair and reasonable under the circumstances.

The last sentence of subsection e (beginning on line 20, p. 5) authorizes indemnities to apply to a Federal district court for an order limiting liability and for apportionment of payments. We have some doubts as to the meaning and procedural effectiveness of this provision. If the committee feels that it is necessary in this bill to include such a provision, it may wish to obtain the views of the Department of Justice.

ADDITIONAL PROVISIONS RECOMMENDED

As Mr. Vance has indicated, if it is the sense of the committee that the type of program incorporated in S. 3929 is preferable to that which would be established in H. R. 11242, we would recommend that the committee consider (1) a reinsurance program which would permit the Commission to enter into agreements with private insurance companies reinsuring such companies for insurance coverage provided by them, (2) the establishing of a fund for use by the Commission in carrying out an indemnity program, and (3) providing that the provisions of the Government Corporation Control Act apply to the activities of the Commission in administering an indemnity program.

In addition we recommend that there be added to the bill provisions substantially similar to paragraphs (1) and (2) on page 2 of H. R. 11242. These provisions would assure that the Government would be under no obligation under the indemnity agreement with respect to damages or claims for damages suffered by persons indemnified under the agreement; or for claims of employees of persons indemnified arising under State or Federal workmen's compensation acts. We recommend, also, addition of a provision substantially similar to subsection d on page 5 of H. R. 11242, expressly authorizing the Commission to include in each indemnity agreement such terms and

conditions, not inconsistent with the bill, as the Commission deems appropriate.

Supplementary to the foregoing comments, a number of changes of a drafting nature have been discussed with the joint committee staff. It would not seem necessary to take the time of the committee to discuss these now. We will be glad to work further with the committee staff if the committee desires us to do so.

That concludes my prepared statement, Mr. Chairman.

Representative PRICE. Mr. Mitchell, as I understand the subject matter you have discussed on pages 4 and 5 with regard to the law applicable to nuclear accidents, it was our thought in the language of that section to avoid technicalities that might arise in any of these claims and provide a greater amount of leeway for the Commission in settling such claims. Is that your understanding?

Mr. MITCHELL. The difficulty we have had with this provision, Mr. Chairman, is that if you disregard all ordinary rules of legal liability, then the Commission is left completely open to make whatever determination they like without any guidelines; and we also have the feeling that presumably the coverage of the private insurers would be couched in terms of legal liability, and if the Government's obligation extended beyond that, then there might be some areas where the Government obligation would be parallel to the obligation of the insurance companies.

Representative PRICE. I think what the committee was attempting to do was to provide for certain leeway in order to avoid the necessity of the Commission having to go to judgment on almost every case.

Mr. MITCHELL. That, we agree, Mr. Chairman, would be desirable; and our suggestion would be that, if the Commission is given authority to make settlements upon the determination that the settlement is fair and reasonable and that the Commission's determination is final, we think this can be accomplished. In other words, we suggest a somewhat different approach in language which would seek to arrive at the same result.

Representative PRICE. I understand our committee staff is exploring that, and perhaps that can be worked out to meet the Commission's feelings with regard to the language of this particular section, and what both of us hope could be accomplished. What we are trying to do is avoid setting up technicalities so strong that you would not be able to handle many of these cases without considerable difficulty.

Mr. MITCHELL. Certainly we would not want that either, Mr. Chairman. I think we are both seeking the same result here.

Representative PRICE. Does committee counsel desire to ask any questions?

Mr. NORRIS. Yes.

Mr. Mitchell, do you see any need for requiring or do you believe it desirable to have the provision that the Government Corporation Control Act apply if there is not a reinsurance program?

Mr. MITCHELL. I think that the Corporation Control Act still would be desirable because it does permit for a simpler system of accounting and auditing. And to the extent that this would be involved even under the indemnity program, I think it probably would be desirable.

Representative PRICE. Mr. Van Zandt.

Representative VAN ZANDT. I have not had a chance to read the statement yet.

Representative PRICE. Mr. Norris.

Mr. NORRIS. Do you believe that it is essential to the program to have a fund available for the Commission in carrying out the terms of either bill?

Mr. MITCHELL. No, sir, I would not say it is essential. Again, it seemed to us this would be a desirable provision, but certainly the program could operate without it.

Mr. NORRIS. What size fund do you think would be appropriate?

Mr. MITCHELL. The suggestion we made in the Commission bill, Mr. Norris, was that the charges collected be placed in the fund. You remember we also had in it the provision for borrowing in the event of an accident which required us to pay out.

Mr. NORRIS. And you think that the sum you set forth in H. R. 11242 is adequate and proper for the straight indemnity program if we should decide to go that way?

Mr. MITCHELL. No, sir, we do not contemplate that this will be an insurance reserve in the ordinary sense, and I believe we explained that in previous hearings.

Mr. NORRIS. I mean as a fund for the operations under the bill.

Mr. MITCHELL. We felt this would be a desirable mechanism; yes, sir.

Mr. NORRIS. I have no further questions.

Representative PRICE. Were you developing their thought with reference to item 2 on page 6 on the establishment of a fund for use by the Commission in carrying on the indemnity program?

Mr. NORRIS. Yes, sir.

Representative PRICE. I missed that. What is the Commission's thinking on that matter?

Mr. MITCHELL. Our feeling, Mr. Chairman, is that, while we recognize that such a fund would not accumulate to the point where it would be adequate to cover a possible incident, we do think that it would have some advantages, particularly with respect to the borrowing power which was incorporated in our bill in the event there were an accident and it were necessary to pay out.

Representative PRICE. Do you feel that any legislation which were passed should contain some provision to make such a fund possible?

Mr. MITCHELL. We think it would be desirable, sir, but we do not believe it to be essential.

Representative PRICE. That is in the Commission's original recommendation, is it not?

Mr. MITCHELL. Yes, sir, it is.

Representative PRICE. Mr. Van Zandt.

Representative VAN ZANDT. No question, thank you.

Representative PRICE. Is there any further presentation from the Commission?

Mr. VANCE. No, sir.

Representative PRICE. Thank you very much, Mr. Vance and Mr. Mitchell.

Mr. MITCHELL. Thank you, Mr. Chairman.

Representative PRICE. The next witness will be Mr. Oscar M. Ruebhausen of the Atomic Energy Committee of the New York City Bar Association.

Mr. Ruebhausen, the committee is very happy to welcome you here this morning. We understand you have been very active as a member of the bar in New York City in atomic energy work. You are to be commended for this interest. We certainly will value your suggestions and presentation here this morning.

STATEMENT OF OSCAR M. RUEBHAUSEN, ATOMIC ENERGY COMMITTEE, NEW YORK CITY BAR ASSOCIATION

Mr. RUEBHAUEN. Mr. Chairman and members of the committee; my name is Oscar M. Ruebhausen. I am appearing as chairman of the special committee on atomic energy of the Association of the Bar of the City of New York.

We are, as you know, a committee of lawyers. Our primary purpose is to promote among ourselves and others an understanding of the impact of atomic energy on our society and contribute where we can to the resolution of legal problems in the atomic field.

I should add, as I have on previous occasions when I have had the pleasure of appearing before this committee, that we have no false confidence in our own wisdom. Atomic energy is an area in which much information is not available to us and much that is available is not within our particular professional competence to evaluate.

In our thinking about legislation to meet the atomic insurance problem we have proceeded from the point of view of endeavoring to ascertain where the public interest lies and to test the legislative proposals in the light of our assessment of this issue.

We recognize that there is no simple formula by which the public interest can be ascertained. Rather, the public interest is a composite of many factors and must represent a balancing of many, and frequently competing, considerations.

At the outset perhaps I should say that while either of the two bills before the committee, H. R. 11242 and S. 3929, could with some revision be made the basis of satisfactory legislation, we believe that the approach of S. 3929 is, on the whole, preferable.

Among the features of S. 3929 which contribute to this conclusion are these:

(1) The indemnity provision of S. 3929 is a mandatory one, whereas in H. R. 11242 the indemnity is discretionary.

(2) Under S. 3929 the proposed indemnity will take effect at that point where reasonably adequate financial protection as determined by the Commission leaves off. Under H. R. 11242, however, it is not contemplated that the indemnity will take effect except above the fixed ceiling of available insurance. Thus there might well be a substantial gap between the actual financial protection available and the point at which the indemnity would become operative. It does not seem to us that the existence of such a gap adequately protects the public. We also wonder whether, in the face of such a gap, atomic development would proceed as broadly and vigorously as possible.

(3) In S. 3929 the indemnity is operative even in situations of bad faith, willful misconduct, or gross negligence. We believe this is sound and that protection should not be denied to the public or to the reactor industry in the event an atomic catastrophe is caused by a willful or negligent act.

As a method of procedure, accordingly, we have thought it more useful this morning to focus our comments on S. 3929. The remainder of my brief remarks will, therefore, be directed toward this latter bill.

In the time that is available I would like to discuss with you a few features of the bill which impress our committee as of particular importance. Then as a supplement to my testimony I would like to leave with you a memorandum which comments in more detail on specific points of drafting and language.

THE $500 MILLION LIMIT

Obviously, the greater the amount of the indemnity, the greater the assurance that can be given to the public that, in the unlikely event of a truly major catastrophe, funds will be available to compensate them for injuries to their person or property. A larger indemnity would moreover tend to minimize what might well turn out to be exceedingly difficult problems of apportionment at some future date if claims for damage are far in excess of tthe amounts available to pay them. Such apportionment problems may be seriously complicated by the probability that damage in some instances will not be discoverable until considerably after the actual occurrence. Finally, an unlimited indemnity would, we think, have eliminated any lingering doubts as to the constitutionality of the proposed limitation on private liability.

On the other hand, we respect the reluctance to put into effect an indemnity without limits. We also recognize that as a practical matter $500 million, plus such private insurance as is available, might be adequate to meet the likely claims. Further, if, at some unfortunate future date, claims for damages arising out of a nuclear incident are substantially in excess of the indemnity available, there is some merit to the suggestion that such a problem can better be handled in the grim light of the actual facts then existing.

Therefore, although candor compels us to express a modest disappointment that the size of the indemnity is not greater than $500 million, we as a committee do not take issue with the judgment involved in fixing the limit at this amount. We feel that additional comfort can be given to members of the public, moreover, if the report of the joint committee which accompanies any proposed legislation clearly negatives any possible interpretation that the $500 million is a final and absolute limit on Federal responsibility regardless of the size of future losses from an atomic incident. We read section 170e (p. 5, lines 18–19) as an index of the congressional intention in this regard. The language there implies that, in the event damages exceed the $500 million indemnity plus the available commercial insurance, other sums "may be made available by the Congress for the payment of such damages."

PERSONS INDEMNIFIED

As S. 3929 is now drafted the class of persons to be indemnified (under sec. 170c) is limited to those persons who own, operate, manufacture, design, or build, or who supply equipment, materials, or services to, a production or utilization facility. A similar limitation is

also found in section 170e of the bill which limits the liability of private persons.

We wonder whether the bill when so limited fully expresses your intention?

Aren't there other classes of persons who might be liable for such a disaster and whose liability should give rise both to the indemnity and to the limitation on liability? Invitees, salesmen, simple, trespassers, and third-party tort-feasors are illustrations. Shouldn't the public have the protection of the indemnity even though the only person legally liable is a stranger to the facility?

Let us suppose for example that an airplane on a commercial flight should, as a result of a faulty propeller, crash into an atomic-power reactor located on a river near a major city. The airline and propeller manufacturer might in such a case be the only persons legally liable. Yet, in such a case, should not the indemnity in the public interest be extended to the airline operator and the propeller manufacturer as well? And should not both of these companies receive the benefit of the limitation on liability?

In short, the question we would pose is this: Should not the indemnity be extended to any person who is legally liable as a result of what might be called an atomic incident?

The interest of the public in having funds available to compensate for its losses would, we think, lead to this conclusion.

THE HAZARDS COVERED

Another question we would like to raise relates to the hazards against which indemnity is to be given. As we read the proposed bill, the indemnity will come into the operation only in the case of liability arising out of the special hazardous properties of atomic materials, and then only if such materials are used in or result from the construction or operation of a particular production or utilization facility.

This emphasis in the bill upon production and utilization facilities undoubtedly gets at the heart of the problem to which the hearings of your committee were directed several weeks ago. Yet we wonder whether it is not your intention to go somewhat further in the interests of protecting the public.

For example, it occurs to us that special nuclear materials (or byproduct materials) may well be shipped by truck or train over bridges, rivers, and highways, through cities and towns. We, as a committee, are not sufficiently advised to know the possible extent of danger from a theoretical mishap in such a situation. If, however, in the opinion of those who have the requisite technical knowledge it is believed that such situations do present unusual hazards arising out of the peculiar properties of special nuclear materials, should not transportation companies, for example, and those who serve, supply or equip them, be brought within the scope both of the indemnity and of the limitation on liability proposed by the bill?

In addition to transportation companies, we wonder whether there are not other categories of business enterprise which may possess from time to time hazardous quantities of special nuclear or byproduct material and yet not be either a production or utilization facility. Included in this group might be warehouses, some fabricators, and some processors of waste products. If so, it is doubtful under the

present bill whether they would be indemnified and their liability limited.

While we do not know the answer to these technical questions, we did think it worthwhile to point them out. If there are such situations, then it might be well to have the indemnity coverage of the bill apply to other cases of damage arising out of the hazardous properties of atomic materials in addition to those cases which are directly related to production or utilization facilities.

LOCATION OF THE HAZARD

There is a further question which is pertinent in this connection. Is it to be the policy of the Congress that an indemnity should be forthcoming only in instances where the source, special nuclear or byproduct materials creating the hazard are physically located within the United States? Or is it to be the policy to provide an indemnity (and limit liability) even in instances where the source, special nuclear or byproduct materials giving rise to the hazard, and the catastrophe, are located outside the United States?

We believe that there are good reasons for limiting, in the present legislation, the application of the indemnity (and of the limitation on liability) to hazards and damages arising out of source, special nuclear and byproduct materials located within the United States. More important, however, is that the policy decision, whatever it may be, be clearly reflected in the proposed bill. As presently drafted, there is one reference in the indemnity section (170c) to facilities "within the United States" from which an intention might possibly be drawn. There is, however, no comparable express reference in the section limiting the liability of private persons (170e). Whatever the ultimate policy may be, we think it desirable that the bill clearly reflect it.

While there are other points relating to the proposed bill which we might discuss, the foregoing are the ones which our committee wished particularly to emphasize. A number of mechanical and drafting suggestions are contained in the memorandum which I am filing with you as a supplement to these remarks.

In closing I should like to express the warm respect and admiration which our committee has for the diligence, the wisdom, and the determination with which you and your staff continue to discharge the crucial responsibilities you bear for service to the Nation and the free world. As citizens and lawyers we are prepared at any time to do all within our capacity to help.

Representative PRICE. Without objection, the supplemental memorandum will be made a part of the record.

(The supplemental memorandum follows:)

SPECIAL COMMITTEE ON ATOMIC ENERGY OF THE ASSOCIATION OF THE BAR OF THE CITY OF NEW YORK

SUPPLEMENTAL MEMORANDUM

This memorandum covers some of the points of drafting which occurred to the committee during the course of its study of S. 3929 and which it hoped might be helpful in carrying out the basic policy objectives of that bill.

I. AMENDMENT OF SECTION 2 OF 1954 ACT

1. The bill should contain some mention of congressional concern for the protection of the public.

2. The constitutional validity of the proposed limitation on liability might be supported by a finding that (a) the possibility of nuclear damage in excess of $500 million plus the commercially available insurance is remote, (b) a limited Federal indemnity coupled with limited private liability will better serve the public than the present situation of no indemnity and unlimited private liability, and (c) in limiting the indemnity to $500 million, S. 3929 should not be interpreted as establishing a ceiling beyond which the Government shall in no event be responsible regardless of the magnitude of the losses caused by a future atomic incident.

3. In addition to the problem of protecting the public, should not the scope of the objectives stated in lines 6 and 7, page 1, of the bill be broader than simply encouraging "the development and operation of production or utilization facilities"? Is not the objective the "fullest development of atomic energy in the national interest"?

II. AMENDMENT OF SECTION 53e (8) OF THE 1954 ACT

1. We believe that it is intended that the licensee should be required to hold harmless the United States and the Commission under section 53e (8) only to the extent of the financial protection required of the licensee pursuant to section 170. If this is so, it might be helpful to revise lines 5 to 10, page 2, of the present bill as follows:

"(8) *up to the limit of financial protection required by the Commission pursuant to section 170 of this Act,* [except to the extent that the United States shall have granted indemnity as provided in section 170 of this Act] the licensee will hold the United States and the Commission harmless from any damages resulting from the use of possession of special nuclear materials by the license." [Italic indicates new language; brackets indicate deletions.]

2. It might be desirable to take this opportunity to amend section 53e (8) further so as more clearly to express what we understand is its intent, namely, that neither the Government nor the Commission shall be liable solely by virtue of the fact that it owns or distributes special nuclear material.

III. PROPOSED SECTION 170a

1. The proposed subsection a might be clarified by specifying the sections of the act of 1954 under which the licenses in question may be issued "for the operation, possession, or use of a production or utilization facility." All licenses under sections 103 and 104 are probably contemplated. What about licenses under section 53? or 62? or 81 and 82?

2. The term "public liability claims" is uncertain in meaning and should be clarified.

3. The intention of section 170a, as we interpret it, to require that financial protection covers not only the licensee but also all others who might be liable, should be clarified.

4. To cover these minor drafting points, we suggest that subsection a be revised as follows:

"a. Each license *issued pursuant to Section 103 or 104 of this Act* [for the operation, possession, or use of a production or utilization facility] shall have as a condition of the license a requirement that the licensee have financial protection of such a type and in such amounts as the Commission shall determine to be reasonably adequate to cover [public] *the legal* liability [claims] *of the licensee and all other persons* arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the construction or operation of the facility. Such financial protection may include private insurance, private contractual indemnities, self-insurance, or a combination of such measures." [Italic indicates new language; brackets indicate deletions.]

IV. PROPOSED SECTION 170b

1. As now drafted, proposed section 170b may fail to express its sponsors' intent in two regards:

(*a*) It is unclear whether the Commission has discretion to require an amount of financial protection greater than the amount of insurance which is

commercially available to the licensee. We believe that the intent was not to require financial protection in amounts larger than the insurance commercially available and that this should be so stated.

(*b*) As now drafted, the four factors to be considered by the Commission might be construed to be the only factors which the Commission could consider. We do not think that this was intended.

2. In addition, we wonder whether the type of ownership is really pertinent to the amount of financial protection which is required in order to protect the public. Would it not be more appropriate to consider the nature and purpose of the reactor?

3. To implement the above suggestions, the present bill might be revised by deleting clauses (1) and (4) of proposed subsection b and revising that subsection, as follows:

"b. In determining the amount of financial protection to be required, the Commission shall take into consideration *such factors as* the following: (1) the cost of [such] insurance *available from private sources*, (2) the type, size, and location of the facility involved, and (3) *the nature and purpose of the licensee: Provided, however, That the Commission shall in no event require financial protection greater than the total amount of insurance available from private commercial sources.*" [Italic indicates new language; brackets indicate deletions.]

V. PROPOSED SECTION 170C

1. As now drafted, section 170c raises two questions:

(*a*) Is it the indemnity or the authority to enter into new indemnities which is to expire on August 1, 1966? We believe that the latter is intended.

(*b*) Is a mandatory for the Commission to indemnify? We think that it should be mandatory.

2. We believe that the category of persons indemnified is narrower than intended. Should not the indemnity cover "all persons legally liable (other than a Government agency) including" the categories specifically mentioned?

3. We believe that the language in proposed section 170c limiting the indemnity to "the activities of the indemnitee during the period of the license" is narrower than intended. It might not cover, for example, faulty design or manufacture of equipment for a facility, or for the facility itself, if such design or manufacture preceded the date of the license for the facility.

4. To carry out the foregoing suggestions, proposed subsection c might be revised as follows:

(*a*) Line 12, page 3: Delete "until";

(*b*) Line 13, page 3, delete "agree to";

(*c*) Lines 22 and 23, page 3, delete "to member of the public";

(*d*) Line 2, page 4, delete;

(*e*) Line 4, page 4, delete "covering";

(*f*) Line 5, page 4, delete "indemnities";

the period of the license"; and

(*g*) Lines 9 and 10, page 4, delete "because of activities of the indemnities during the period of the license"; and

(*h*) Insert the following italicized language:

"c. The Commission shall, *as a condition of all licenses issued prior to* August 1, 1966, indemnify and hold harmless *all persons legally liable, including* the owner, operator, manufacturer, designer, or builder of a production or utilization facility and each supplier of equipment, material, or services for such facility, as their interests may appear, in the event of claims arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the construction or operation of the facility constructed or operated under license from the Commission, against that liability for bodily injury or death or property damage, including loss of use, which is in excess of the amount of financial protection required, but not to exceed $500,000,000 in the aggregate for each *incident for any one facility within the United States.* The Commission shall execute such a contract of indemnification with the licensee *for the benefit of the licensee and any other person who might be legally liable and such a contract of indemnity shall cover* the liability of all *persons legally liable* arising out of, or resulting from, the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the construction or operation of the facility."

VI. PROPOSED SECTION 170D

1. Proposed section 170d might be revised to parallel our suggestions above in paragraphs 2 and 3 of the comments on proposed section 170c.

2. If the public is to be properly protected, should not the phrase (lines 3 and 4, p. 5) limiting the indemnity to "activities performed within the terms of the contract" be deleted?

(*a*) The phrase invites an issue being made over whether the nuclear accident was the result of a contractor's acts "within the scope of his employment." The public should be protected whether or not the contractor was performing properly under his contract with the AEC.

(*b*) The phrase would also seem to exclude from the benefits of the indemnity all persons whose services are not specifically set forth or covered by the contract.

3. If the public is to be fully protected, should not the indemnification in Commission contracts be made mandatory rather than discretionary?

VII. PROPOSED SECTION 170E

1. The scope of the limitation on liability in proposed section 170e is not clear—it refers to specific categories of persons and then "all other parties set forth in subsections c and d." Shouldn't the limitation on liability extend to "*all persons indemnified* pursuant to subsections c and d of section 170"? Would not this eliminate the need for repeating considerable language? It would also assist in making the scope of the limitation of liability coextensive with the availability of an indemnity—and this seems desirable both for constitutional reasons and in the interest of fairness.

2. In order to protect the public in the event total claims appear to exceed the maximum amount for which the indemnities are to be liable, should not the Commission be authorized to obtain an order limiting liability, apportioning the payments that should be made and staying the payment of claims pending such apportionment?

3. Would it be desirable specifically to indicate that in any apportionment order an amount may be set aside to meet future claims for damage, the incidence of which may not be immediately apparent?

Representative PRICE. Thank you very much, Mr. Ruebhausen, for a very fine statement.

I might say that you have touched on some points that have given concern to the committee and which, I am very happy to be able to tell you, the committee staff have been working on. The draft of the bill we have here as originally introduced I do not think will be the same as it will come out of the committee. I am sure you are going to find many of the points that you have raised taken care of in the final product of the committee.

For instance, on page 4, you say:

The language there implies that, in the event damages exceed the $500 million indemnity plus the available commercial insurance, other sums "may be made available by the Congress for the payment of such damages."

I think the very fact this language is in the bill indicates the committee feels and is thinking along the same lines you are on the subject, but we had to leave it flexible. We could not put in too much higher than that without causing a great furor on the part of the public, and we left it flexible to show the Congress will deal with the subject and take another look at it, if necessary, at a future time.

On page 5, the paragraph beginning:

Aren't there other classes of persons who might be liable for such a disaster and whose liability should give rise both to the indemnity and to the limitation on liability?

I think we are in agreement with you, and the committee is giving attention and thought to that now, and I think we have already prepared a draft.

Do you have a copy of the bill before you?

Mr. RUEBHAUSEN. Yes; I do, Mr. Price.

Representative PRICE. After the word "facility," the committee staff has already prepared an amendment, which I am sure the committee will consider—"and any other person who may be liable." I think that takes care of the point that you raised there.

Mr. RUEBHAUSEN. Yes.

Representative PRICE. On page 6, where you say:

> Yet, in such a case, should not the indemnity in the public interest be extended to the airline operator and the propeller manufacturer as well?

Attention is also being given to that problem.

Likewise in the bottom paragraph on page 6 where you state:

> This emphasis in the bill upon production and utilization facilities undoubtedly gets at the heart of the problem to which the hearings of your committee were directed several weeks ago. Yet we wonder whether it is not your intention to go somewhat further in the interests of protecting the public.

I would say that it is the committee's primary interest to protect the public and what has given rise to this indemnity program. Our staff is now working on strengthening the provision of the bill in regard to that suggestion that you made there.

Page 7, the first paragraph deals with a very interesting point with which the committee is dealing. I think that you envision there source material and special material in transit in some way and an accident occurs, for instance, on a railroad running across a trestle over a water supply for some major city and the whole water supply might be contaminated. The committee staff has envisioned that also, and they are trying to strengthen this legislation to be certain that those types of incidents are taken care of in this legislation.

In the second paragraph on that page:

> Included in this group might be warehouses, some fabricators and some processors of waste products. If so, it is doubtful under the present bill whether they would be indemnified and their liability limited.

We do not feel it is doubtful. It might be, and the committee will certainly take a further look at the language; but we do not feel that it is because those are contractors or licensees, and we feel they are covered by the language of the act. Of course, we are willing to given attention to strengthening the language if they are not, because that is the intention of the committee.

On page 8, under "Location of the hazard," you raise two interesting points which the committee has talked about in meetings and has considered, and which we feel the answer to the first part of that question:

> Is it to be the policy of the Congress that an indemnity should be forthcoming only in instances where the source, special nuclear or byproduct materials creating the hazard are physically located within the United States?

I would say that is correct.

The question in the latter part of that paragraph deals with international situations, and we feel the answer to that is "No." I do not know how you feel about that, but that is the way the committee feels

about it. We, however, can take a look at it again. We have considered and discussed it.

You just ask this question here. You do not state your feeling or the feeling of the New York Bar Association on the matter.

Mr. RUEBHAUSEN. Mr. Chairman, on that particular point, we feel that it is quite important in the present legislation where we are dealing with immediate problems of concern to this country and to the reactor development in this country, it is particularly important to take care of the domestic issue.

Representative PRICE. Yes.

Mr. RUEBHAUSEN. But we also feel it is an important aspect of national policy to make certain that some of our atomic know-how and development are made available throughout the rest of the world, and ultimately the foreign problem should be faced. But we think before that can probably be faced there must be some negotiation with foreign governments.

Representative PRICE. That is true, and the committee, of course, takes that into consideration. There is negotiation with foreign governments, and it is something we do not feel has to be covered legislatively.

Mr. RUEBHAUSEN. Certainly not at this time. Ultimately there might have to be something. Insofar as we are concerned the picture is not clear in terms of what the laws of liability of other countries might be, or in terms of what other countries might be prepared to do by way of indemnity, or in terms of what our Government might be able to negotiate as part of bilateral agreements.

Mr. NORRIS. Mr. Ruebhausen, I am sure I would express the sense of the committee, as I have received it on this point so far, as being that where we are going to place reactors abroad, the agreements for cooperation will contain a hold-harmless clause for the Government. The contractors in this country who will be furnishing the information and the reactor will be able to negotiate a simlar hold-harmless clause. Then if there is any damage arising in those foreign countries, those countries will be responsible themselves.

If as a result of those activities there is further damage within the United States, then this is a problem that the Congress might want to take a look at at that time.

Mr. RUEBHAUSEN. Right.

Representative PRICE. We feel that section 170e does clearly define the policy on that matter because in line 20, you will note, it says:

> In the event that such damages exceed this aggregate sum, any indemnitee may apply to the appropriate district court of the United States having venue * * *.

That naturally limits it to the confines of the United States. The district court has venue only within the United States.

Mr. RUEBHAUSEN. I think the point probably could be made somewhat more clear with some additional drafting.

Representative PRICE. The committee will give attention to it. We think you have raised some very interesting points, and we certainly appreciate your suggestions to the committee. I am certain every one of them will be given consideration.

Mr. Van Zandt?

Representative VAN ZANDT. I want to join the chairman in congratulating you on your statement. I think it is excellent.

Mr. RUEBHAUSEN. Thank you, sir.

Representative VAN ZANDT. On page 2 you say:

> Thus there might well be a substantial gap between the actual financial protection available and the point at which the indemnity would become operative.

Would you please elaborate on that statement?

Mr. RUEBHAUSEN. That statement deals with H. R. 11242, where it is contemplated that the indemnity would take effect above the fixed ceiling of available insurance although the particular person indemnified may not have taken out the full amount of available insurance.

Let us assume the available insurance is $65 million and only $2 million of insurance was taken out. The gap between $2 million and $65 million is not covered unless the person is financially responsible to meet whatever damages might occur in that area.

Representative VAN ZANDT. Then the Government participation could be designed so that it reached back and assisted the company that only had $2 million even though $65 million was available.

Mr. RUEBHAUSEN. It reaches down to $2 million?

Representative VAN ZANDT. Yes.

Mr. RUEBHAUSEN. As I understand it, this is the purport of S. 3929. The Commission would determine what is the adequate or proper level of financial protection and the indemnity would then reach down to that, and the Commission would require that there be actually available financial protection up to that point.

Representative VAN ZANDT. On page 4, you say:

> Therefore, although candor compels us to express a modest disappointment that the size of the indemnity is not greater than $500 million, we as a committee do not take issue with the judgment involved in fixing the limit at this amount.

What amount would you suggest?

Mr. RUEBHAUSEN. Sir, I wish I could be of help to you on this, but it is really a problem beyond our competence. We do not know, and I do not think anyone probably really knows the answer, but we certainly would have been happier with a billion than 500 million.

Representative VAN ZANDT. You favor a billion dollars?

Mr. RUEBHAUSEN. With a billion instead of 500 million. But we as a committee are not in a position to take issue or disagree with the judgment expressed here, although I think the greater the indemnity, the better pleased we would be, because the greater the assurance that would be given to the public that their claims, if any, for damage would be taken care of.

Representative VAN ZANDT. If you were a member of this joint committee with the knowledge that you and your associates in New York have in this field, would you recommend a billion instead of 500 million?

Mr. RUEBHAUSEN. Sir, I would think that I would get the very best of scientific advice I could get as to the potential hazards, and I would make a judgment in terms of what the likelihood is likely to be. The range, as I have gathered—I have not read all the testimony—indicates the damages could be much higher than $500 million.

Representative PRICE. May I explain the reason for the decision made? We will take that into consideration. We want that section to be flexible, and that throws too great of a scare out to the public. Especially since we do not ever believe we will have to use the indemnity provisions of this act.

Representative VAN ZANDT. That is all, Mr. Chairman.

Representative PRICE. Mr. Kilday?

Representative KILDAY. No questions.

Representative PRICE. Thank you very much, Mr. Ruebhausen. May I express the gratitude of the committee for permitting the staff to have available Mr. Murphy for working out some of these technical problems.

Mr. RUEBHAUSEN. Thank you. It has been our pleasure to be of any assistance we can.

Representative PRICE. We are glad to see Mr. Murphy here with you.

Mr. RUEBHAUSEN. He is a member of our committee, sir.

Representative PRICE. The next witness will be Mr. Stoddard M. Stevens, Sullivan & Cromwell, New York City. Mr. Stevens, would you come around please? We are glad to have you back again. We appreciated your serving as a member of the seminar, and you were very helpful to us.

STATEMENT OF STODDARD M. STEVENS, SULLIVAN & CROMWELL, NEW YORK CITY, N. Y.

Mr. STEVENS. I appreciate very much the privilege of attending that seminar, Mr. Price, and also having the opportunity to testify generally on the problems before you in May. I thought it would be better at this time to make some specific and detailed suggestions which would be more helpful at this late period in your deliberations.

Representative PRICE. We will be glad to have your presentation, Mr. Stevens.

Mr. STEVENS. Mr. Chairman and gentlemen of the committee, my name is Stoddard M. Stevens and I am a member of the law firm of Sullivan & Cromwell of New York City. In accordance with the invitation of the chairman in his telegram of June 2, 1956, which I appreciate very much, I respectfully submit some suggested amendments to bill S. 3929 introduced in the Senate of the United States by Mr. Anderson.

It has not been possible in the time available between the receipt of the proposed legislation and my testimony here today to examine all phases of the bills proposed by Mr. Anderson and Mr. Cole with the eye of a legislative draftsman. Therefore, my specific suggested amendments are confined to S. 3929, the approach and general subtance of which I heartily endorse, and are centered around the following special problems:

(1) Provision for licensees of special nuclear material or byproduct material who may use these materials in facilities which are not production or utilization facilities as defined in the Atomic Energy Act of 1954 or in the regulations of the Atomic Energy Commission.

(2) Extension of the indemnification with respect to facilities to all functions required to be licensed under the Atomic Energy Act of 1954 and the regulations of the Atomic Energy Commission.

(3) Clarification of the time limitation on the indemnification contracts and not to obligations under contracts entered into prior to the cutoff date.

(4) Extension of the indemnification to include persons who will perform functions, such as design work, prior to the issuance of an AEC license.

(5) Provision for required financial protection up to the point of the Government indemnification in terms of "reasonableness" rather than in terms of a finding by the AEC that the protection is "adequate," since the primary reason for the proposed legislation lies in the fact that "adequate" private insurance cannot be obtained.

(6) Extension of the indemnification to cover licenses already granted under the 1954 act.

(7) Provision for cooperation by the AEC with private insurance organizations in the event that both may have obligations with respect to a single incident.

The method of presentation of my suggested amendments is to set forth my suggested changes in the various subsections by repeating the entire subsection, indicating suggested deletions with brackets and suggested insertions by underlining. By footnotes keyed to the passages containing suggested changes I have attempted to state briefly my reasons for the changes.

Mr. Price, I am not sure you want me to go over each one of these in detail.

Representative PRICE. I wonder if you could do this: If you pick out what you consider to be the most important changes that you would suggest, and then I assure you the committee staff will thoroughly consider all of the other suggestions.

Mr. STEVENS. Just let me run them over briefly.

You will see on page 3 I propose in subdivision i to expand that section somewhat by inserting the words "use of atomic energy so as to make the maximum contribution to the general welfare." In other words, bringing that under the general welfare provision of the Constitution; and also expanding later on by deleting "design, construction, or operation of such facilities" and adding "development and use of atomic energy." In other words, broadening out the language somewhat.

As I say below there, the purpose of this is to broaden the statement to cover activities other than production and utilization facilities.

Going to section 170a, it is suggested that the scope be expanded somewhat so that it will read:

Each license for the operation, possession, use—

and then the following words are new—

transfer or receipt in interstate commerce, manufacture, production, or acquisition—

those words are from the act, Mr. Price—

of a production or utilization facility or for the receipt, possession, use, or transfer of special nuclear material or for the manufacture, production, transfer, receipt, acquisition, ownership, possession, or use of byproduct material.

Those were, it semed to me, left out of the Anderson bill.

You will see there—I am not sure it is desirable to go down and point out each of these changes, but the reasons for each change are specifically listed under six paragraphs which are set forth at the bottom of page 4 and all of page 5.

Again we suggest certain changes and amendments to section 170c, and the purposes of these changes are:

(1) To bring within the indemnification persons performing functions required to be licensed under sections 101, 103, and 104 of the 1954 act and sections 50.10, 50.21, and 50.22 of the AEC regulations.

(2) To bring within the indemnity persons responsible for component parts which have been excluded from the definitions of production and utilization facilities pursuant to section 50.2 (a) of the regulations of the Atomic Energy Commission.

(3) To bring within the indemnification holders of construction permits issued pursuant to section 185 of the 1954 act, which would include persons responsible for modification of production or utilization facilities.

(4) To bring within the indemnity persons who will utilize special nuclear and byproduct material in facilities which are not production or utilization facilities as defined by the Atomic Energy Act of 1954 or the regulations of the Atomic Energy Commission.

(5) To avoid making the enumeration of the possible sources of claims against which the indemnification is granted narrower than the enumeration of persons granted the indemnification at the beginning of subsection c and to include indemnification for persons using special nuclear material or byproduct material apart from production or utilization facilities.

(6) To make it clear that the limitation on the indemnification applies to one incident at one facility and to conform the indemnification limitation to the suggested inclusion within the indemnification of special nuclear material and byproduct material licensees.

(7) To conform the provisions for the indemnification contract to the grant of the indemnification.

(8) To conform the indemnification contract provisions to the redraft of the sources of claims against which indemnification is to be granted as suggested at (5) above.

(9) To avoid limiting the indemnification to activities during the period of the license, since many of the persons proposed to be covered by the indemnification may perform their functions prior to the grant of the license. For example, design work may be done even before the grant of a construction permit and construction may be done under a construction permit but prior to the grant of a license.

(10) To make it clear that the cutoff of the indemnification applies only to the execution of new contracts after August, 1, 1966, but does not operate to terminate indemnifications granted prior to August 1, 1966.

And in connection with (10), you will see that I have suggested on page 6, on the first line, eliminating the words "until August 1, 1966," but adding a provision on page 7 of my statement, near the bottom, to the effect that "No such contract of indemnification shall be executed by the Commission after August 1, 1966."

(11) To provide indemnification for persons already holding licenses granted under the 1954 act.

Now with respect to section 170d, certain suggestions, 7 in number have been made, and if you will turn to page 10 of my statement, I will read the reasons.

(1) To broaden the functions covered by the indemnification and to conform to the grant of indemnification in subsection c.

(2) To cover facilities which are not production or utilization facilities as defined in the 1954 act and AEC regulations.

(3) Same explanation as given in note (4) under subsection a.

(4) To conform the description of the possible sources of claims against which indemnification is given to the functions performed by the persons suggested to be added to the indemnification at (1) above.

(5) Conceivably certain indemnified activities, such as design, could be done prior to the period of the contract and still be within the terms of the contract; the requirement that the activities indemnified be performed within the terms of the contract appears sufficient to exclude noncontract activities without a further requirement that the activities take place during the period of the contract.

(6) To conform the limitation of the indemnification to that contained in subsection c.

(7) To conform to the language of subsection c.

Now with respect to the proposed changes in section 170e which you will note on page 11. The reasons for those are set out on page 12.

(1) To make the limitations on liability applicable to both joint and several liability.

(2) To conform the limitation of liability to the indemnification granted under subsection c.

(3) To make the limitation on liability coextensive with the scope of the indemnification suggested at (5) under subsection c.

With respect to the proposed changes in section 170f, which appear on page 12 of my statement, the reasons given on page 13 are:

(1) To provide charges for special nuclear and byproduct material licensees and construction permittees in accordance with the suggestion made above that such licensees and permittees included within the indemnification.

With respect to the changes set forth on page 12 of my statement regarding section 170h, the reasons for those changes are given as follows:

(1) Since private insurance companies are expected to be responsible for the basic financial protection, some provision should be made for their participation in such matters as settlement and litigation for that portion of the claims for which they may be liable.

In that connection, you see that on page 13 we have underlined the words in section 107h "but with respect to any such payment, appearance, settlement, defense, representation or taking charge, the Commission shall, to the fullest extent practicable, cooperate with such private insurance organizations as may have rights or obligations in connection with the incident."

Because of the limited time available to study the two bills introduced on this subject, I am not prepared to make detailed comments on H. R. 11242 introduced by Mr. Cole in the House of Representatives. However, I would like to note certain general problems I see in H. R. 11242.

Several problems appear to be common to both S. 3929 and H. R. 11242:

(1) Neither bill provides coverage for activities outside the United States. Since, as a result of the bilateral agreements entered into and about to be entered into, pursuant to chapter 11 of the 1954 act, it is

to be expected that significant activity in the atomic-energy field will be conducted by United States national abroad, I suggest that a section 125 be added to chapter 11, authorizing the Commission in these bilateral agreements to provide idemnification by foreign governments running to the United States Government coextensive with the indemnification presently contained in section 53e (8) of the 1954 act and an indemnification running to United States nationals performing activities under the bilateral agreements coextensive with the indemnification contained in the proposed legislation. The indemnification for United States nationals could properly include a limitation on liability coextensive with that proposed in section 170e of S. 3929.

(2) Neither bill provides for coverage of licensees already licensed under the 1954 act. A specific suggestion to cover this problem has been made above with respect to S. 3929.

(3) No specific coverage is given to byproduct or special nuclear material licensees who may be manufacturing or operating facilities which are not production or utilization facilities as defined in the act. A specific suggestion to cover this problem has been made above with respect to S. 3929.

(4) Both bills limit the coverage to occurrences during the effective period of a license and, as pointed out above in connection with S. 3929, certain interested persons, such as designers, may perform the functions prior to the actual grant of a Commission license, or even a construction permit. A specific suggestion to cover this problem has been made above with respect to S. 3929.

The following appears to me as specific advantages of H. R. 11242:

(1) Subsection a makes it clear that the 10-year cutoff date is applicable only to the conclusion of new agreements and that any indemnity granted pursuant to an agreement executed prior to the cutoff date will be effective beyond the cutoff date and for the full period of the permit of license. A specific suggestion to incorporate this idea in S. 3929 has been made above.

(2) Subsection a authorizes indemnification agreements with the holders of permits as well as licenses. Since a great deal of the work on a utilization or production facility will be done under a construction permit, this extension appears desirable and a specific suggestion to incorporate this proposal in S. 3929 has been made above.

I see the following problems in H. R. 11242:

(1) No criteria are established in subsection a (3) to guide the Commission in determining the amount of required nongovernmental insurance.

(2) Uncertainty in the effectiveness of the Government indemnification is introduced by the language of subsection a (6). If such an "escape provision" is to be included, I suggest that much uncertainty would be eliminated by limiting the exceptions to "wilfull misconduct" on the part of the indemnitee or an agent of the indemnitee acting within the scope of his employment as is the case under article 25 of the Warsaw convention, which limits liability of international air carriers.

(3) Since the charge to be made for indemnification coverage is left open under subsection b, there arises the possibility of inadequate coverage of component suppliers and other nonlicensees. Because the bill does not authorize an indemnification agreement with anyone

other than the holder of a permit or a license, persons doing work under a permit or license held by others would not be able to take advantage of more indemnification than that decided upon by the licensee or the permit holder. Therefore, I suggest that if indemnification is to be provided in increments, as provided in H. R. 11242, provision be made for separate agreements with indemnitees other than permit or license holders.

(4) Since this size of atomic risks cannot be accurately estimated, the proposal contained in Mr. Cole's bill that no ceiling be placed on the amount of indemnification has certain advantages. However, subsection f, which limits the amount of notes at any one time outstanding to $500 million introduces the possibility that subsection f is intended to place a limit on the indemnification. If this is the case, the indemnification coverage under H. R. 11242 is not as complete as under S. 3929 since the $500 million limit in subsection f applies to all activities under the indemnification legislation and is not limited to activities with respect to one incident at any one facility.

That concludes my prepared statement, Mr. Price.

Representative PRICE. Thank you very much, Mr. Stevens. We are very happy to have your detailed statement. I am sure it has been helpful to us here this morning and to the committee staff in working on revisions of the proposed legislation.

Without objection, the complete statement of Mr. Stevens will be included in the record.

(The statement referred to follows:)

STATEMENT OF STODDARD M. STEVENS BEFORE THE JOINT COMMITTEE ON ATOMIC ENERGY, JUNE 14, 1956

Mr. Chairman and gentlemen of the committee, my name is Stoddard M. Stevens and I am a member of the law firm of Sullivan & Cromwell of New York City. In accordance with the invitation of the chairman in his telegram of June 2, 1956, which I appreciate very much, I respectfully submit some suggested amendments to bill S. 3929 introduced in the Senate of the United States by Mr. Anderson.

It has not been possible in the time available between the receipt of the proposed legislation and my testimony here today to examine all phases of the bills proposed by Mr. Anderson and Mr. Cole with the eye of a legislative draftsman. Therefore, my specific suggested amendments are confined to S. 3929, the approach and general substance of which I heartily endorse, and are centered around the following special problems:

(1) Provision for licensees of special nuclear material or byproduct material who may use these materials in facilities which are not production or utilization facilities as defined in the Atomic Energy Act of 1954 or in the regulations of the Atomic Energy Commission.

(2) Extension of the indemnification with respect to facilities to all functions required to be licensed under the Atomic Energy Act of 1954 and the regulations of the Atomic Energy Commission.

(3) Clarification of the time limitation on the indemnification so as to make the cutoff date applicable to new indemnification contracts and not to obligations under contracts entered into prior to the cutoff date.

(4) Extension of the indemnification to include persons who will perform functions, such as design work, prior to the issuance of an AEC license.

(5) Provision for required financial protection up to the point of the Government indemnification in terms of "reasonableness" rather than in terms of a finding by the AEC that the protection is "adequate," since the primary reason for the proposed legislation lies in the fact that "adequate" private insurance cannot be obtained.

(6) Extension of the indemnification to cover licenses already granted under the 1954 act.

(7) Provision for cooperation by the AEC with private insurance organizations in the event that both may have obligations with respect to a single incident.

The method of presentation of my suggested amendments is to set forth my suggested changes in the various subsections by repeating the entire subsection, indicating suggested deletions with brackets and suggested insertions with italics. By footnotes keyed to the passages containing suggested changes I have attempted to state briefly my reasons for the changes.

SUGGESTED CHANGES IN SECTION 2i

"i. In order to encourage the development and [operation of production or utilization facilities] *use of atomic energy so as to make the maximum contribution to the general welfare, it is essential that* (1) the United States [may] (1) assume liability for a portion of the damages *which may be* suffered by the public in connection with the [design, construction, or operation of such facilities] *development and use of atomic energy,* (1) and [may] limit the liability of those persons responsible for such losses."

Reasons

(1) To conform the legislative finding to the declarations of section 1 and the findings of section 2 of the 1954 act and to broaden the statement to cover activities other than production and utilization facilities.

SUGGESTED CHANGES IN SECTION 170a

"a. Each license for the operation, possession, [or] use, *transfer or receipt in interstate commerce, manufacture, production, or acquisition* (1) of a production or utilization facility *or for the receipt, possession, use or transfer of special nuclear material* (2) *or for the manufacture, production, transfer, receipt, acquisition, ownership, possession or use of byproduct material* (3) shall have as a condition of the license a requirement that the licensee have financial protection of such a type and in such amounts as the Commission shall determine to be [reasonably adequate to cover] *reasonable with respect to* (4) public liability claims arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from [the construction or operation of the facility] *such licensed facility or arising out of or resulting from such licensed special nuclear material or byproduct material.* (5) Such financial protection may include private insurance, private contractual indemnities, self insurance, or a combination of such measures. *All licenses of the types specified in this subsection a. issued prior to the date of enactment of this section shall be amended so as to accord with the provisions hereof.* (6)"

Reasons

(1) The added words are intended to make the requirement of financial protection applicable to the functions requiring facilities licenses under sections 101, 103, and 104 of the 1954 act and sections 50.10, 50.21, and 50.22 of the AEC regulations.

(2) To include the functions with respect to special nuclear material required to be licensed by sections 53 and 57 of the 1954 act and section 70.3 of the AEC regulations and to cover licensees of special nuclear material who may not use such material in connection with a production or utilization facility, such as in the conduct (as authorized by sec. 53a (1) of the 1954 act) of research and development activities of the type specified in section 31 of the 1954 act and use by a licensed transferee of a licensee as contemplated by section 70.42 of the AEC regulations.

(3) To include the functions with respect to byproduct material required to be licensed by section 81 of the 1954 act and section 30.3 of the AEC regulations and to cover licensees of byproduct material who may not use such material in connection with production or utilization facilities, such as in the conduct (as authorized by section 63a (1) of the 1954 act) of research and development activities of the type specified in section 31 of the 1954 act and use by a processor as authorized by section 30.24 (e) of the AEC regulations.

(4) To require a determination that protection is "adequate" is to introduce an inconsistency; the need for this legislation arises from the fact that private financial protection cannot be obtained in "adequate" amounts because of the technological possibilities of damage which could under unlikely circumstances

be caused by an atomic-energy facility. A requirement that the required protection be "reasonable," when coupled with the statement of factors to be considered in obtaining the amount of required protection contained in subsection b, would seem preferable to imposing upon the AEC the duty to make a finding that the protection is adequate to cover the public liability claims in question.

(5) To avoid making the description of the possible sources of claims against which financial protection is required narrower than the description of licenses which are to have financial protection as a requirement and to include claims arising from special nuclear material and byproduct material when used apart from production or utilization facilities.

(6) To make possible the indemnification of licensees holding licenses already granted under the 1954 act.

SUGGESTED CHANGES IN SECTION 170C

"c. The Commission shall [until August 1, 1966] agree to indemnify and hold harmless the owner, operator, manufacturer, designer, or builder of a production or utilization facility *and each person (1) licensed to transfer or receive in interstate commerce, produce, transfer, acquire, possess or use a production or utilization facility and each manufacturer, designer or builder (2) of a component part of a production or utilization facility* and *each holder (3) of a construction permit for a production or utilization facility* and each supplier of equipment, material, or services for such facility, as their interests may appear, *and each licensee of special nuclear material and byproduct material, (4)* in the event of claims arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from [the construction or operation of the facility constructed or operated under license from the Commission] *the facility or arising out of or resulting from special nuclear material or byproduct material licensed by the Commission* (5) against that liability to members of the public for bodily injury or death or property damage, including loss of use, which is in excess of the amount of financial protection required, but not to exceed $500,000,000 in the aggregate for [each facility within the United States and for each incident] *any one incident (6) involving any one facility within the United States or any one incident involving any one licensee of special nuclear material or byproduct material within the United States.* The Commission shall execute such a contract of indemnification with the licensee *or permittee* (3) covering the liability of all [indemnities] *persons entitled (7) to indemnification under this subsection c, as their respective interests may appear, against all claims* arising out of, or resulting from, the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the [construction or operation of the facility because of activities of the indemnitee during the period of the licenses.] *licensed (8) facility or licensed special nuclear material or byproduct material. The expiration date of the indemnification (9) under any such contract or indemnification shall be the date of expiration of the license or permit held by the licensee or permittee entitled to the indemnification (10) under this subsection c and indemnification under such contract shall apply to liability for claims which have their origin in activities or events occurring prior to such expiration. No such contract of indemnification (10) shall be executed by the Commission after August 1, 1966. Such a contract of indemnification (11) shall be executed with each licensee whose license is amended in accordance with the provisions of subsection a.*"

Reasons

(1) To bring within the indemnification persons performing functions required to be licensed under sections 101, 103, and 104 of the 1954 act and sections 50.10, 50.21, and 50.22 of the AEC regulations.

(2) To bring within the indemnity persons responsible for component parts which have been excluded from the definitions of production and utilization facilities pursuant to section 50.2 (a) of the regulations of the Atomic Energy Commission.

(3) To bring within the indemnification holders of construction permits issued pursuant to section 185 of the 1954 act, which would include persons responsible for modification of production or utilization facilities.

(4) To bring within the indemnity persons who will utilize special nuclear and byproduct material in facilities which are not production or utilization facilities as defined by the Atomic Energy Act of 1954 or the regulations of the Atomic Energy Commission.

(5) To avoid making the enumeration of the possible sources of claims against which the indemnification is granted narrower than the enumeration of persons granted the indemnification at the beginning of subsection c and to include indemnification for persons using special nuclear material or byproduct material apart from production or utilization facilities.

(6) To make it clear that the limitation on the indemnification applies to one incident at one facility and to conform the indemnification limitation to the suggested inclusion within the indemnification of special nuclear material and byproduct material licensees.

(7) To conform the provisions for the indemnification contract to the grant of the indemnification.

(8) To conform the indemnification contract provisions to the redrait of the sources of claims against which indemnification is to be granted as suggested at (5) above.

(9) To avoid limiting the indemnification to activities during the period of the license, since many of the persons proposed to be covered by the indemnification may perform their functions prior to the grant of the license. For example, design work may be done even before the grant of a construction permit and construction may be done under a construction permit but prior to the grant of a license.

(10) To make it clear that the cutoff of the indemnification applies only to the execution of new contracts after August 1, 1966, but does not operate to terminate indemnifications granted prior to August 1, 1966.

11) To provide indemnification for persons already holding licenses granted under the 1954 act.

SUGGESTED CHANGES IN SECTION 170D

"d. In addition to any other authority the Commission may have, the Commission is authorized until August 1, 1966, to enter into agreements of indemnification with its contractors for the *design, manufacture,* (1) construction or operation of production or utilization facilities *or of facilities* (2) *using special nuclear material or byproduct material* for the benefit of the United States, in which the Commisison may require its contractor to provide financial protection of such a type and in such amounts as the Commission shall determine to be [reasonably adequate] *reasonable with respect* (3) to [cover] public liability claims arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from [the construction or operation of] (4) the facility [because of activities of the indemnitee during the period of the contract] (5) and to indemnify the contractor against such claims for such sums above the amount of the financial protection required, but not in excess of $500,000,000 *for any one incident at any one facility.* (6) Such agreements shall be for activities performed within the terms of the contract and shall include the liability of subcontractors and suppliers, *as their interests may appear,* (7) and be applicable to lump sum as well as cost type contracts and to contracts financed in whole or in part by the Commission."

Reasons

(1) To broaden the functions covered by the indemnification and to conform to the grant of indemnification in subsection c.

(2) To cover facilities which are not production or utilization facilities as defined in the 1954 act and AEC regulations.

(3) Same explanation as given in note (4) under subsection a.

(4) To conform the description of the possible sources of claims against which indemnification is given to the functions performed by the persons suggested to be added to the indemnification at (1) above.

(5) Conceivably certain indemnified activities, such as design, could be done prior to the period of the contract and still be within the terms of the contract; the requirement that the activities indemnified be performed within the terms of the contract appears sufficient to exclude noncontract activities without a further requirement that the activities take place during the period of the contract.

(6) To conform the limitation of the indemnification to that contained in subsection c.

(7) To conform to the language of subsection c.

SUGGESTED CHANGES IN SECTION 170E

"e. The owner, constructor, or operator of a production or utilization facility and all other parties set forth in subsections c. and d., *or any of them,* (1) above shall not be liable for [damages] *claims for bodily injury or death or property damages, including loss of use,* (2) arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from [the construction or operation of] (3) the facility *or arising out of or resulting from licensed special nuclear material or licensed byproduct material* (3) in an aggregate amount of more than the amount of the financial protection required by the Commission to be obtained, together with the sums set forth in subsections c. and d. above, and any other sums which may be made available by the Congress for the payment of such damages. In the event that such damages exceed this aggregate sum, any indemnitee may apply to the appropriate District Court of the United States having venue in bankruptcy matters over the location of the facility, for an order limiting the liability of all indemnities, including all contractors and subcontractors in accordance with the provisions of this section, and for further orders, as appropriate, apportioning the payments to be made to such claimants upon appropriate proof of damage and permitting partial payments to be made before final determination of the total claims."

Reasons

(1) To make the limitations on liability applicable to both joint and several liability.

(2) To conform the limitation of liability to the indemnification granted under subsection c.

(3) To make the limitation on liability coextensive with the scope of the indemnification suggested at (5) under subsection c.

SUGGESTED CHANGES IN SECTION 170F

"f. The Commission is authorized to charge for the right of indemnification given by this section to licensees of *and holders of construction permits for* (1) production and utilization facilities *and licensees of special nuclear material and byproduct material.* (1) This charge shall be $10,000 per year for facilities licensed under section 103 *and for persons or activities licensed under section 53a. (3).* (1) For facilities licensed under section 104, *for persons or activities licensed under sections 53a. (1), 53a. (2), and 81, and for construction permits issued under Section 185,* (1) the Commission is authorized to reduce the charges set forth above, taking into consideration: (1) the type and location of facility involved, (2) the amount and type of fuel, (3) the purpose for which the facility is built, and (4) the ownership of the facility, whether (a) private, (b) public, (c) profitmaking, or (d) nonprofit. All sums collected by the Commission pursuant to this subsection shall be made a part of and be merged with apropriations to be used by the Commission for research and development."

Reasons

(1) To provide charges for special nuclear and byproduct material licensees and construction permittees in accordance with the suggestion made above that such licensees and permittees included within the indemnification.

SUGGESTED CHANGES IN SECTION 170H

"h. Where it appears that there may be damages arising out of any incident for which the United States shall be required to make an indemnification under this section, the Commission shall be authorized in the agreement of indemnification to approve the payment of any claim and to appear through the Attorney General on behalf of the indemnitee in any action and to settle or defend any such litigation or claim and to represent the indemnitee in or take charge of any such proceedings *but with respect to any such payment, appearance, settlement, defense, representation, or taking charge, the Commission shall, to the fullest extent practicable, cooperate with such private insurance organizations as may have rights or obligations in connection with the incident.* (1) The Commission shall have authority to settle or approve the settlement of claims without regard to the rules of legal liability in the State of the accident, and regardless of whether liability has been established by the judgment of any court."

Reason

(1) Since private insurance companies are expected to be responsible for the basic financial protection, some provision should be made for their participation in such matters as settlement and litigation for that portion of the claims for which they may be liable.

Because of the limited time available to study the two bills introduced on this subject, I am not prepared to make detailed comments on H. R. 11242 introduced by Mr. Cole in the House of Representatives. However, I would like to note certain general problems I see in H. R. 11242.

Several problems appear to be common to both S. 3929 and H. R. 11242:

(1) Neither bill provides coverage for activities outside the United States. Since, as a result of the bilateral agreements entered into and about to be entered into, pursuant to chapter 11 of the 1954 act, it is to be expected that significant activity in the atomic-energy field will be conducted by United States nationals abroad, I suggest that a section 125 be added to chapter 11, authorizing the Commission in these bilateral agreements to provide indemnification by foreign governments running to the United States Government coextensive with the indemnification presently contained in section 53e (8) of the 1954 act and an indemnification running to United States nationals performing activities under the bilateral agreements coextensive with the indemnification contained in the proposed legislation. The indemnification for United States nationals could properly include a limitation on liability coextensive with that proposed in section 170e of S. 3929.

(2) Neither bill provides for coverage of licensees already licensed under the 1954 act. A specific suggestion to cover this problem has been made above with respect to S. 3929.

(3) No specific coverage is given to byproduct or special nuclear material licensees who may be manufacturing or operating facilities which are not production or utilization facilities as defined in the act. A specific suggestion to cover this problem has been made above with respect to S. 3929.

(4) Both bills limit the coverage to occurrences during the effective period of a license and, as pointed out above in connection with S. 3929, certain interested persons, such as designers, may perform the functions prior to the actual grant of a Commission license, or even a construction permit. A specific suggestion to cover this problem has been made above with respect to S. 3929.

The following appears to me as specific advantages of H. R. 11252:

(1) Subsection a makes it clear that the 10-year cutoff date is applicable only to the conclusion of new agreements and that any indemnity granted pursuant to an agreement executed prior to the cutoff date will be effective beyond the cutoff date and for the full period of the permit or license. A specific suggestion to incorporate this idea in S. 3929 has been made above.

(2) Subsection a authorizes indemnification agreements with the holders of permits as well as licenses. Since a great deal of the work on a utilization or production facility will be done under a construction permit, this extension appears desirable and a specific suggestion to incorporate this proposal in S. 3929 has been made above.

I see the following problems in H. R. 11242:

(1) No criteria are established in subsection a (3) to guide the Commission in determining the amount of required nongovernmental insurance.

(2) Uncertainty in the effectiveness of the Government indemnification is introduced by the language of subsection a (6). If such an escape provision is to be included, I suggest that much uncertainty would be eliminated by limiting the exceptions to "willful misconduct" on the part of indemnitee or an agent of the indemnitee acting within the scope of his employment as in the case under article 25 of the Warsaw Convention, which limits liability of international air carriers.

(3) Since the charge to be made for indemnification coverage is left open under subsection b, there arises the possibility of inadequate coverage of component suppliers and other nonlicensees. Because the bill does not authorize an indemnification agreement with anyone other than the holder of a permit or a license, persons doing work under a permit or license held by others would not be able to take advantage of more indemnification than that decided upon by the licensee or the permit holder. Therefore, I suggest that if indemnification is to be provided in increments, provision be made for separate agreements with indemnitees other than permit or license holders.

(4) Since the size of atomic risks cannot be accurately estimated, the proposal contained in Mr. Cole's bill that no ceiling be placed on the amount of indemnification has certain advantages. However, subsection f, which limits the amount of notes at any one time outstanding to $500 million, introduces the possibility that subsection f is intended to place a limit on the indemnification. If this is the case, the indemnification coverage under H. R. 11242 is not as complete as under S. 3929 since the $500 million limit in subsection f applies to all activities under the indemnification legislation and is not limited to activities with respect to one incident at any one facility.

Representative PRICE. Mr. Stevens, you took point by point your suggested revisions of the bill, and I might say that some of these items are already under consideration by the committee. Others have come to our attention for the first time through your suggestions here this morning, and some of them appear interesting enough for us to give serious thought to.

Your provision No. 1, I might state that the committee is working on that at the present time:

Provision for licensees of special nuclear material or byproduct material who may use these materials in facilities which are not production or utilization facilities as defined in the Atomic Energy Act of 1954 or in the regulations of the Atomic Energy Commission.

We are giving thought to that and working on it at the present time.

The same is true of your second suggestion.

Item No. 3:

Clarification of the time limitation on the indemnification so as to make the cutoff date applicable to new indemnification contracts and not to obligations under contracts entered into prior to the cutoff date.

This is the first time we have come across that point, at least the first time I have, and the committee will work on that.

Your suggestion No. 4:

Extension of the indemnification to include persons who will perform functions, such as design work, prior to the issuance of an AEC license—

is very much in the mind of the committee, and we are working on that.

Point No. 5 is a good point. It comes to my attention, at least, for the first time, and I am sure that attention will be given to it.

Your point No. 6:

Extension of the indemnification to cover licenses already granted under the 1954 Act—

is in mind and will be worked on.

The same is true for suggestion No. 7.

Are there any questions?

Representative KILDAY. No questions.

Representative PRICE. Does counsel have any questions?

Mr. NORRIS. I have no questions. I do have one comment I would like to make with respect to your suggestion that we include specific language addresed toward construction permits. This has been omitted from the draft on purpose in view of the provision in section 185 of the Atomic Energy Act which deals with construction permits. The last sentence of that section reads:

For all other purposes of this act a construction permit is deemed to be a license.

Therefore, every time we use the word "license" throughout this we include construction permits.

Mr. STEVENS. The trouble is, though, you will find from the standpoint of legislative draftsmanship you use the word "license" not only as a noun but as the verb, and the trouble comes in the use of the verb "licensed."

I am dealing with a technical point now, but I think that is the trouble there. "License," you see, is used as a noun in the 1954 act. In the Anderson bill it is also used as a verb, and I think you might have a construction question there.

Mr. NORRIS. Yes, we will look further at it.

Representative PRICE. Mr. Stevens, do you consider Senate bill 3929 to be preferable over the Commission's bill?

Mr. STEVENS. That is a very difficult question. I think they are both good bills. I think from the standpoint of workability that I prefer S. 3929. Of course, it would be quite possible to do with H. R. 11242 what I suggested here with respect to S. 3929. And there are certain advantages with H. R. 11242. Of course, the unlimited liability protection is one.

As I have pointed out, I like 3929 much better as it does not have the escape clause with respect to gross negligence, and all of the difficulties we would get into on that matter. I pointed that question out in my last testimony here last month. But I think that S. 3929 is a first-class workable bill.

Representative PRICE. Thank you very much, Mr. Stevens. The committee appreciates your cooperation.

Mr. STEVENS. I will be very glad to be of any further help the committee wishes.

Representative PRICE. I understand that Mr. H. W. Yount is in the audience, and he has filed a statement with the committee. If he would desire to present that statement verbally before the committee, we would be very glad to hear from him. Mr. Yount, we are very happy to have you make a personal appearance. I do not know whether you intended to do so, but we are certainly happy to have you here.

STATEMENT OF H. W. YOUNT, VICE PRESIDENT, AMERICAN MUTUAL ALLIANCE

Mr. YOUNT. I told Mr. Brown that I thought it would not be necessary, I would submit a statement and be present to answer any questions if you like. But if you would like the statement presented, I would be happy to do it.

Representative PRICE. We will be glad to have the benefit of your judgment as to the respective bills under consideration.

Mr. YOUNT. On May 18, 1956, we submitted a statement outlining some of the problems of insurance involved in connection with the atomic energy program and certain principles which we felt were important in the consideration of any legislation dealing with the problem. Today we are submitting comments with respect to two bills which have been submitted as a result of previous hearings; namely, H. R. 11242 and S. 3929.

In order to expedite consideration of our suggestions we will discuss each bill separately, although some of the comments apply to both bills.

Our comments with respect to H. R. 11242 are as follows:

1. The statement of interests to be covered under the indemnification agreement at the top of page 2 appears adequate to cover our previous suggestion that all interests should be covered at each location. This provision should tie in with the proposed insurance industry program with respect to insuring such operations. If full agreement on the method of stating the interests to be covered in the insurance policy can be reached promptly it would be well to look at both statements with a view to achieving consistency.

By that, Mr. Price, we felt that the Government indemnity approach should tie in with insurance and the interests covered should be the same and losses should be the same and so on. That is our general approach to the problem so that, in the event of losses, the Government portion would flow along naturally from the insurance portion.

2. The statement at line 15 on page 2 as to workmen's compensation seems too sweeping. If retained it should be confined to employees of those actually working at the facility whose employment exposes them to the hazards associated therewith. As it stands, inasmuch as designers, suppliers, etc., may be "persons indemnified," employees of such persons who happen to be located near a facility may be injured by an incident arising out of the operation of the facil yti.
seems to be no reason why the employer of such employees should not be able to subrogate against the corporation responsible for the injuries. Those obliged to pay workmen's compensation benefits to employees at nearby plants should not be denied their normal subrogation rights simply because they happen to occupy the status of supplier of material, and so on.

In that connection, we were not quite clear to just the intent of that exclusion, but we felt that the statement in the bill was entirely too broad and that if any exclusion was to go in with respect to liability arising under workmen's compensation, the intent should be clearly stated that it applies only to employees that are located in and around and in connection with the facility and not to neighboring plants.

3. The statement of the liability to be covered in (4) line 1, page 3, is crucial and presents various problems. A comparable statement for the insurance policies is needed but has not yet been drafted in final form. The two statements should be consistent. I believe that heretofore we have been attempting to state the effects to be covered rather than the causes. We have been seeking language which would talk about damages resulting from radiation or radioactive contamination from the use of radioactive materials.

We believe it is not the intent of this section as presently stated to include so-called products liability in connection with products which may be experimented with or made radioactive in an experimental or research reactor. If the ultimate decision is to include any such hazards some change in the language of this provision may be required.

4. We judge that the intent is to make clear that the indemnity agreement applies only to accidents which take place during, rather than before or after, the term of the license—in other words that this is intended to serve the purpose of a "policy period" provision in an insurance policy. Some difficulty arises from the use of the expression "occurrences during the—term" because this may have the unintended effect of ruling out such things as cancer or other in-

jurious effects of exposure which do not "occur" until years later—perhaps after the term of the license has expired. We suggest that this language be clarified and think that the word "accident" would be less subject to such difficulties of interpretation than "occurrences."

5. As we understand it the legislation has for one (perhaps the essential and most important) purpose that of enabling members of the public to turn to a solvent defendant for their damages. This cannot occur if the person or corporation responsible has been made insolvent by the incident out of which the damages have arisen and the governmental indemnity is made unavailable. If "bad faith," etc., is to serve to prevent the indemnity from becoming available this primary purpose of the law is defeated. Also, we believe such provisions are unworkable because the disqualifying conditions "bad faith," etc., are very difficult to establish and thus only serve to promote litigation and uncertainties. If a choice must be made between benefiting the public and penalizing the corporation or individual responsible for the negligence, or bad faith, the penalty should be dropped.

In other words, we feel that in H. R. 11242 that "bad faith" provision is almost unworkable in practice and probably should be eliminated entirely.

6. Paragraph b, line 20, page 3, contemplates "an annual charge for indemnity coverage." Inevitably such charges, which in effect are charges for limits of liability hitherto unknown in the insurance business, will be the basis of comparision with the rates charged by insurance carriers for the lower and more probable limits of liability. We suggest the advisability of including the grant of Government indemnity in the license and making the license fee a function of the power level of the reactor. Such charge might be nominal at $5 or $10 per 1,000 kilowatt-hours of heat capacity with a nominal upset minimum of perhaps $100 for the smallest installations. The language of the present section implies that there is some basis upon which sound insurance rates can be determined for these high catastrophe coverages. We believe that neither the insurance industry nor the Government agencies have any such crystal ball, and that the problem should be approached frankly as one of indemnification, and not stated in insurance terminology, if this is determined to be the appropriate public policy.

7. Section c, line 8, page 4, makes provision for reinsurance from the Commission. We are not entirely clear as to what is contemplated by this section. The insurance industry has not as yet asked for a Government reinsurance program but of course might have to do so if other sources of reinsurance were inadequate or if access thereto should be denied to any particular segment of the business. It may be that this provision is designed as an incentive to help the insurance industry develop capacity through its own resources or to guard against monopoly in the insurance field as in other phases of the program. With these possibilities in mind we make no objection to such provision. We believe that to be more effective it should provide for some amount of Government reinsurance to be available both below and above the attachment point of the amount of private insurance determined to be available under paragraph (3), page 2. We do not know whether such provision would be utilized or not

but if the other objective is to broaden the market the idea of a lower point of availability might be incorporated.

8. Paragraph 3, beginning at line 8, page 5, provides that the funds derived from the sale of indemnity shall be deposited in a new indemnity fund. The amounts to be collected will be extremely small in relation to the amount of hazard involved. In keeping with our general thought that this is not an insurance transaction as such, we prefer to see moneys derived from this source used for safety inspection work as provided in S. 3929 rather than as proposed.

9. Paragraphs g, h, i, j, and k on pages 6 and 7 are apparently designed to make it possible for the work of handling coverage and claims to be performed with a minimum of delay. We believe it highly desirable that the full facilities of the insurance industry be utilized to the maximum extent possible in the development under such a program. We would like to point out the difficulties under which claim adjustments and payments will be made in which there may be many thousands of claims of varied character in which both the insurance industry and the Government will have a stake. It is highly desirable that the initial legislation make it possible to handle this situation on a practical basis without the necessity for endless litigation and delay in the processing of such claims. In particular, monies should be made available for use for paying approved claims without waiting for the defendant to make separate arrangements to finance the prior payment of claims against him. We may have further suggestions along this line and if so would be glad to submit them at a later date.

That is we think that these are extremely important provisions, and rather than propose specific language we believe that the bill should be drafted so that monies could be advanced on an approved claim basis prior to actual payment by the indemnitee and then getting his money back from the Government.

The arrangements that were used during the war on certain other insurance transactions might be used as a precedent in that connection.

Turning now to Senate 3929. This covers much of the same ground as H. R. 11242. However, our comments are offered section by section with occasional cross reference to previous comments.

1. We like the general idea of a preamble. We believe, however, that it would be desirable to clarify the language of this provision. If its purpose is to authorize the United States to assume a portion of the liability of those directly responsible to respond in damages at the suit of members of the public sustaining bodily injury or property damage, we think a more specific statement should be devised. That refers to the statement the Government shall assume a portion of the liability. As it stands it raises a question as to whether it means to say, in effect, "The United States will pay injured people." While this will actually be the net result, the mechanism used is not a direct assumption of liability by the Government but rather an assurance by the Government that those responsible will not be rendered insolvent and thus unable to pay claims.

The legal question as to whether the Government can, in this field, limit the liability of persons responsible is not discussed in these comments. No doubt this problem has or will receive legal study.

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2. We believe it necessary that the hold-harmless clause in the present Atomic Energy Act be amended or eliminated. There is a question whether the amendment proposed goes far enough. Thus, we favor some such provision as is stated in section 2, lines 3, and so forth, page 2. Consideration might be given to the elimination of the present clause in its entirety.

On thinking that over a little further since this was dictated, there is the problem involved, of course, of the ownership of a dangerous substance as such, which runs through the legal bases of suits in a good many States, and perhaps it is for that reason that some continuation will be needed.

3. Paragraph a of new section 170, line 20, page 2, again raises the question as to a more complete definition of what is intended as to the scope of coverage of "public liability claims." See comments on this subject under the House bill.

4. Paragraph b, line 4, page 3, attempts to spell out exactly what the Commission should take into consideration in determining the amount of financial protection to be required. Any change in such considerations would require a change in the law. Thus the suggestion is made that the Commission be given power to determine what additional considerations may be taken into account.

That comment, I think, runs to the root of the whole bill, Mr. Price. If you are going to attempt to spell out every consideration and everything that can or cannot be done, when you run into an impractical situation it is necessary to go back and get the law amended. For that reason our suggestion would be that the bill be drafted with a clear and concise statement of principles with some latitude allowed for the interpretation of those principles.

5. Because of the nature of the insurance problem in connection with these operations, provision should be made to take care of the situation in which the Government and the contractor may wish to go ahead even if the desired amount of private insurance capacity is not available. It would seem that the Commission would have to have a commitment from the several facilities set up by the insurance companies that the maximum capacity will be made available wherever required or provision will have to be made in the legislation that Government assumption may attach at a point beyond which private insurance is not available on a specific project. This might even go so far as to provide for flexibility in requirements contingent upon changes in the aggregate insurance capacity available as affected by the reinsurance market. See comments under House bill in this respect.

This comment was added as an afterthought on the assumption that insurance conditions do change and a bad result somewhere might result in cancellation of capacity, so that we would find ourselves in the position where the amount we thought we had to start with would not be available.

6. We suggest that paragraph c, page 4, line 5, would be clearer if it read, "All interests referred to in this paragraph arising out of or resulting from * * *."

We understand that these agreements would apply to claims arising at any time out of activities during the license period.

I think Mr. Stevens commented on that point at length. It was not clear as to whether there was to be a cutoff in the date beyond

which no further Government indemnification would be made on any new licensee, but that the indemnification would continue for the lifetime of the licenses issued up until that point, or whether there was to be a definite cutoff in Government indemnification. And we agree with his comments that there should be clarification of that so it is definite what is intended.

7. The proposal in paragraph d, page 4, to extend the same sort of indemnity protection to Commission contractors appears necessary in order to place all licensees and contractors on a common basis. Furthermore, it seems desirable that if losses are to be limited with respect to private contractors they should also be limited to Commission contractors.

8. Paragraph 3, page 5, provides for a limitation of liability in the amount of the insurance required plus the Government indemnification. While we previously opposed the principle of the limitation of loss, we believe that if the amount is to be set as high as $500 million that most of our previous objections become theoretical only. The legal problem remains.

In our appearance on May 18 we objected in principle to the idea of limiting losses. We still think that that may not be such a good principle, but if you are to have catastrophic possibilities of this sort, and you set the limits high enough, then most of our objections disappear.

9. We believe the provision in paragraph 3, page 5, for a procedure to establish limitation of liability is necessary in view of the joint interests of the insurance companies and the Government in the amount of losses involved. Such a procedure would make it possible for the prompt processing of the payment of claims and would avoid unnecessary delays and litigation.

10. Paragraph (f), page 6, provides for a schedule of charges for the indemnification. In this connection see our comments in reference to the similar provision of the House bill.

11. We believe a provision such as paragraph (h), page 7, is absolutely necessary if claims are to be handled in an expeditious manner. Perhaps the language is a little too broad in some respects, but the idea is good. Also it seems highly advisable to make clear that the Government may advance money to pay approved claims prior to payments being made by those immediately liable. Some such language as the following:

*** * * and shall have authority to make payment of approved claims and judgments or to advance moneys therefor prior to such claims or judgments having been paid by the person responsible therefor—**

would be advisable. That is to get a workable basis of operations, and we commented on that briefly before.

Representative PRICE. Did I gather from the analysis of the two bills that you have presented that you would express a preference at this point at least for Senate bill 3929?

Mr. YOUNT. I think we would say that from the standpoint of draftsmanship, and so on, that 3929 would be a little preferable. If it is decided that some reinsurance provision is needed, such as that included in the House bill, that could be added. We think they both aim at the same result, and probably from a working model to continue your revision S. 3929 is preferable.

Representative PRICE. Mr. Yount, in his presentation Mr. Stevens made a suggested change in section 170 (h). His suggestion was in respect to—I will read the whole section so you can follow it:

Where it appears that there may be damages arising out of any incident for which the United States shall be required to make an indemnification under this section, the Commission shall be authorized in the agreement of indemnification to approve the payment of any claim and to appear through the Attorney General on behalf of the indemnitee in any action and to settle or defend any such litigation or claim and to represent the indemnitee in or take charge of any such proceedings—

and this is Mr. Stevens' suggested amendment to that section—

but with respect to any such payment, appearance, settlement, defense, representation or taking charge, the Commission shall, to the fullest extent practicable, cooperate with such private insurance organizations as may have rights or obligations in connection with the incident.

What is your comment on that subject or suggestion?

Mr. YOUNT. I assume that the bill was drafted to operate in the manner contemplated by Mr. Stevens. If it would not, then I form the suggestion.

Representative PRICE. Any questions, Mr. Van Zandt?

Representative VAN ZANDT. No questions, thank you.

Representative PRICE. Mr. Norris, do you have questions?

Mr. NORRIS. I do not believe so. Thank you.

Representative PRICE. I am informed by the staff, Mr. Yount, that was intended.

Mr. YOUNT. I judged it was from reading the several sections together.

Representative PRICE. Thank you very much, Mr. Yount. We deeply appreciate your appearance here this morning and your suggestions.

The committee will recess until 2 o'clock this afternoon.

(Whereupon, at 11:50 a. m., the joint committee recessed until 2 p m., this same day.)

AFTERNOON SESSION

Present: Senator Anderson (chairman of the committee) presiding; Representatives Price, Cole, and Van Zandt.

Chairman ANDERSON. The committee will be in order.

Our first witness this afternoon will be Mr. Charles J. Haugh.

I thought I would read into the record some proposed alterations in this bill so that if any witnesses who testified this morning or who testifies this afternoon wishes to do so, he can comment on those suggestions. It has been suggested that on page 2 of S. 3929, at line 5, that the subsection read:

Except to the extent that the provisions of section 170 of this act apply, the licensee will hold the United States and the Commission harmless.

These are by a group of lawyers who have been studying this bill from the standpoint of companies who may be operating under it.

Line 20 of the same page, there is a suggestion that:

The licensee have financial protection of a type and in such amounts as the Commission shall not determine to be reasonably adequate to cover public liability damages but requiring in accordance with subsection (b) to make provisions for public liability damages.

On page 3, under line 9, after the numeral (4), instead of, "Type of ownership of facility," and so forth, "The nature and purpose of the license."

It may be a shorter way of saying it. There are a good many more here. Since the staff has considered them maybe I might say that if you want to see them the staff has these suggestions in front of it.

I will just turn over to one more and that is page 7, where it says in lines 17 and 18:

The Commission shall have authority to settle or approve the settlement of claims without regard to the rules of legal liability in the State of the accident, and regardless of whether liability has been established by the judgment of any court.

Cross out, "without regard," and the rest of the sentence and say, "on a fair and reasonable basis." Again, it is shorter language that may or may not be better. The other language raises the question of abrogration of State law.

STATEMENT OF CHARLES J. HAUGH, REPRESENTING ASSOCIATION OF CASUALTY AND SURETY COMPANIES

Mr. HAUGH. Yes, sir, it does.

Chairman ANDERSON. This language would avoid that difficulty.

Mr. HAUGH. That other language had us worried.

Chairman ANDERSON. I realize that. That is why this language is suggested because there is a question as to whether the Government can walk in and say that the law of the Government completely supplants or abrogates the laws of the State with reference to protection of its own citizens. But if you say the Commission shall have authority to approve the settlement of claims on a fair and reasonable basis, it does it.

I do not think it is quite the same because if there is any State authority to which it should be submitted it might be satisfied. I will grant you, Congressman Cole, that we are off in the new field and this question of what the Federal Government does to protect the citizens of a State who have rights under their own State laws is a tough one. There have been recommendations from many people.

You may proceed, Mr. Haugh.

Mr. HAUGH. My name is Charles J. Haugh, second vice president of the Travelers Insurance Co., and I am here representing the Nuclear Energy Liability Insurance Association which is the company syndicate organized for the purpose of writing liability insurance on reactors.

I would like to state at the outset, if I might, Mr. Chairman, that the brevity of my written statement is not because I think there is very little to be said on this subject, but I was admonished in the wire to limit myself to three pages, and I have undertaken to do so.

I appreciate this opportunity to appear before you in connection with the two bills currently under consideration. I shall be as brief as possible.

In connection with S. 3929, I would like to present for your consideration suggested amendments as follows:

b. The financial protection to be required shall be in an amount equal to the amount of private insurance available at the time of granting the license un-

less there be: (1) a finding by the Commission that such private insurance is not available on reasonable terms and conditions from companies authorized to do an insurance business in the United States; or (2) a finding by the Commission that the type of facility to be licensed does not involve a catastrophe potential of that magnitude. There shall be established in any such finding by the Commission the amount of financial protection to be required.

This amendment is proposed in the interest of providing what I believe to be a more readily administered provision and one which at the same time retains what I understand to be the primary objectives of this bill as originally drafted. This suggestion derives from a consideration of similar language which has appeared in other provisions for Government insurance and would serve to assure the atomic industry of protection against any possibility of unreasonably high insurance rates.

I believe that the proposed amendment would also take care of the problem of the low-power reactor on a basis entirely consistent with the public interest.

I would like to urge that paragraph (f) appearing on lines 7 to 21, inclusive, on page 6 of the bill be deleted. This recommendation is made for the reason that the charge provided therein will produce a negligible increment to the appropriations to be used for research and development and is of little or no value as a source of income out of which to defray any indemnification which the Commission might be called upon to assume under this legislation.

I recommend the amendment of paragraph (h) on page 7 of the bill by substituting a colon for the period on line 21 and adding the following clause:

Provided, however, **That such action by the Commission shall not constitute an admission of liability on the part of the licensee.**

Might I say there, Mr. Chairman, it might very well be that the change which you cited just a moment ago may be one which very readily takes care of this particular provision.

Chairman ANDERSON. I do not believe I understand the purpose of those words. It says:

The Commission shall have authority to settle or approve the settlement of claims without regard to the rules of legal liability in the State of the accident, and regardless of whether liability has been established by the judgment of any court: *Provided, however,* That such action by the Commission shall not constitute an admission of liability on the part of the licensee.

Mr. HAUGH. Perhaps your revised phraseology eliminates the necessity of this. What I had in mind was this: This might have been construed to revise the whole concept of liability and what we were undertaking to write was a liability insurance contract.

We did not want this to be construed to say it is not a liability insurance contract. There is no question of liability, you just pay. That is why I suggested some wording. It may very well be, as you say with the revised phraseology, the need for this may disappear.

At the previous hearing of your committee I indicated that the insurance industry is opposed to the legislation suggested at that time by the Atomic Energy Commission, and, more specifically, is opposed to the reinsurance provision incorporated therein. For the record, I should like to reiterate that position by referring to the record of the previous hearing.

I did that, sir, in the interest of not undertaking to repeat what was discussed at the last hearing. I am perfectly willing to discuss it if you wish, but it seems to me that nothing is gained by repeating that.

Again, I want to thank you gentlemen for this opportunity to appear before you and to submit the views of myself and my confreres in the insurance industry.

May I repeat again that the brevity of my statement is not to be interpreted that this is not of vital importance to us and something in which we were not intensely interested.

Chairman ANDERSON. Thank you. I may say to you, that the language which is in the bill on page 7 was an attempt on the part of the staff to get around this question of being required to prove the liability for the accident that takes place.

In other words, if something happened to the reactor do you have to try to find out whose fault it was, was it the fault of the man who designed it, the Government who approved it, the firm who built it, or the utility that was operating it? You would have an endless process. But the people who have been damaged have been damaged regardless of who caused it. This was to try to say that the Commission would settle them on a fair and reasonable basis.

Mr. HAUGH. That is what I understood. I wanted to be sure that it did not go beyond that.

Chairman ANDERSON. Are there any questions?

Representative COLE. I have no questions, but I fancy that this may be the last time that Mr. Haugh will appear before the committee, and I am sure the chairman will want to express the appreciation of the committee to Mr. Haugh and his group who have been working on this matter for well over a year, and the fine contributions they have made for finding a solution to this problem.

Mr. HAUGH. Thank you very much.

Chairman ANDERSON. I would be very happy to take the very splendid suggestion that Congressman Cole has made. Your people have done a good job in cooperating, and if we sometimes fail to say so that is an oversight. We do appreciate it. Have you any preferences in the approach of these two bills? I am not trying to pin you down.

Mr. HAUGH. I understand. First, may I thank you sir, for your statement. May I say as between the two bills, our group greatly prefers S. 3929 for the reasons cited earlier. We are definitely and wholeheartedly opposed to the idea of reinsurance and the Government being in the reinsurance business.

Chairman ANDERSON. I think I ought to say this: The Atomic Energy Commission came up with a proposal which Congressman Cole was kind enough to introduce as a basis of studying.

The Atomic Energy Commission is to be commended for having a proposed piece of language before us that it could submit with the approval of the Bureau of the Budget. I am happy to say that the staff which took that and used it as a basis of departure came up with some other language and had the benefit of hearings. I think they did a good job.

Mr. HAUGH. We appreciate that. I certainly think they did. We prefer the Senate bill.

Chairman ANDERSON. We will see after the committee works on the bill, we will try to give a final show to 3 or 4 groups that are interested

if there are some changes made. Because, in making changes, we may have overlooked something.

Mr. HAUGH. Thank you, we shall try to do so.

Chairman ANDERSON. Mr. Biemiller.

(Mr. Price presiding.)

Representative PRICE. The Committee is very happy to welcome our former colleague from Iowa, Mr. Biemiller.

STATEMENT OF ANDREW J. BIEMILLER, LEGISLATIVE REPRESENTATIVE, AMERICAN FEDERATION OF LABOR AND CONGRESS OF INDUSTRIAL ORGANIZATIONS

Mr. BIEMILLER. Thank you, Mr. Chairman. For the record my name is Andrew J. Biemiller. I am a legislative representative for the American Federation of Labor and Congress of Industrial Organizations, with offices at 815 Sixteenth Street NW., Washington, D. C. I am accompanied by Mr. Leo Goodman of our research department.

This statement is a supplement to the one which I gave May 21, 1956, before this Committee on the problems involved in the pending legislation. Subsequent to that appearance, revised bills in the nature of a compromise between the positions taken in H. R. 9071 and H. R. 9802 and the bill proposed by the Atomic Energy Commission in their testimony of May 15 (H. R. 11242) have been filed by the chairmen, Senator Clinton Anderson and Congressman Melvin Price in S. 3929 and H. R. 11523.

We note especially the sentence in the chairman's statement which reads:

> This bill, like the principles outlined in my April 26 letter, should be regarded merely as a basis for careful review and suggestions, both from the standpoint of substance and of drafting.

We reiterate the position taken in our earlier testimony and we rely upon the whole raft of evidence which has been released since we appeared here last in confirmation of our position, that the whole subject of radiation hazard and the consequent insurance problems which flow therefrom, require an immediate extensive and detailed investigation. And we reiterate our earlier conclusion that existing legislation does not adequately protect either the workers in the plant who have already had extensive damage, the members of the community who have been inadvertently exposed, nor the potential victims of accident, or chance association damage.

Representative COLE. Mr. Biemiller, I am struck by your statement of workers in the plant who have already had extensive damage. I wonder to what you were making reference?

Mr. BIEMILLER. We submitted instances in our previous testimony, Congressman Cole, and we are now getting even greater evidence together than we had available at that time of instances of very serious damage to workers in the plants and the kind of damage which we do not think is adequately being taken care of under the workmen's compensation laws.

Representative COLE. Is it the type of injury that emanates from the nature of employment?

Mr. BIEMILLER. Yes, sir. Radiation accidents and explosive accidents.

Representative COLE. Is the damage or injury severe to a few cases or on the other hand, mild to many cases? I am not familiar with the damage to which you make reference. That is why I am seeking the information now.

Mr. BIEMILLER. We know of some very severe cases. It is that type with which we are particularly concerned. As we stated in our earlier testimony we are very concerned that there ought to be more of an investigation made than has been and than we have facilities for doing so at the moment. We are trying to accumulate every bit of evidence we can get our hands on today.

Representative COLE. Do those injuries you speak of occur in atomic energy plants?

Mr. BIEMILLER. Yes, atomic energy plants.

Representative COLE. Owned by the Government and operated by contract for the AEC, I assume?

Mr. BIEMILLER. For instance, just to cite one which we referred to earlier, there is the case down at Oak Ridge of a Mr. Cardwell, which has been a very serious case. We do not feel it has been adequately handled. Since I last testified, I understand the man has been forced to return to work, but with a very lowered life expectancy as a result of his experiences in that plant.

Representative PRICE. I think those are pertinent facts that this committee should have been kept informed of which we have not been informed of. It may be somewhere in the voluminous reports that we receive but no specific reports have come to us on this type of accident.

Mr. BIEMILLER. If you recall, Mr. Chairman, that was precisely one of the points we made in our earlier testimony. We felt that there had not been adequate reporting to this committee on the type of problem we were talking about. It is one of the complaints that we have been making constantly arising from supersecrecy in connection with these matters.

There have been instances where our local unions have difficulty ascertaining just what is happening and as a result have extreme difficulty in filing claims under the present inadequate workmen's compensation laws.

Representative PRICE. I have heard several such cases. I think the committee should give attention to these. I hope we will look into that.

Representative COLE. Just to complete the support of your statement, do you have any instances of members of a community who have been inadvertently exposed? There is, of course, a potential hazard to such persons. I am asking if there are any instances of such?

Mr. BIEMILLER. Here is one instance. I quote from the Oak Ridger, of Oak Ridge, Tenn., November 2, 1955. The headline was: "Information Officer Flown to Scene of Radioactive-Cargoed Truck Mishap":

> A public information officer from Oak Ridge flew to Bardstown, Ky., last Wednesday to quiet the nerves of the townspeople there who suddenly had a cargo of radioactive material dumped in their town from a truck accident.
>
> Wayne Range, of the local information office of the Atomic Energy Commission, assured the residents there was no danger from the uranium compound that fell off a truck which had turned over in the town early in the morning.
>
> The "slightly radioactive" compound was contained in a tank on the trailer of the truck which had turned over on its side. R. L. McKamey, 36, 105 Tucker Road, the driver who was en route from Portsmouth, Ohio, to Paducah, Ky., with

the cargo, was unhurt in the accident. The compound itself remained inside the tank.

A spokesman here said that, since the accident occurred inside a town, the AEC felt it wise to dispatch an information officer to the scene so that reports of the danger involved would not be magnified. The scene was marked off by signposts by State and city police. A truck from Portsmouth was sent to pick up the tank.

That is an incident of the kind of thing we are fearful of.

Representative COLE. The people of that community were just exposed to a possible injury.

Mr. BIEMILLER. That is right.

Representative COLE. There is no evidence of anybody having been injured?

Mr. BIEMILLER. That is right. But we are referring to the fact that these things can happen as a community problem.

Representative COLE. Your next statement would cover that as well?

Mr. BIEMILLER. Yes.

Representative COLE. The potential victims of accidents. I understand.

Representative VAN ZANDT. Mr. Biemiller, do you have any information of other incidents where employees of a contractor working for the AEC have been exposed or are suffering as a result of exposure?

Mr. BIEMILLER. We entered in our previous statement an Oak Ridge case of an explosion that occurred.

Representative VAN ZANDT. That was in the newspapers?

Mr. BIEMILLER. Then there is this Belvoir case right close at home that we are still concerned about. I mean close to Washington.

Representative VAN ZANDT. Periodically members of this committee get reports on these incidents. I am impressed by your statement that there are many incidents concerning which we do not get a report. I am trying to develop information about these incidents of which we do not have any knowledge.

Mr. BIEMILLER. We are now putting together every bit of information we can get our hands on from our unions who in turn are having difficulty getting the facts. You are probably also familiar with this one which we entered in our last testimony of eight personal injury claims at Y–12 plant finally having been settled, the largest one of which was a $75,000 settlement to a gentleman who suffered permanent blindness and a fractured collarbone.

These things are happening.

Representative VAN ZANDT. That is true. Over a period of years they have been happening and it is my understanding that this committee receives a report on all these incidents.

Mr. BIEMILLER. We would like to get the reports.

Representative PRICE. Mr. Biemiller, I would like to state the type of accident you referred to a moment ago in discussion with Congressman Cole is being given some thought by the committee staff. They are trying to work out a provision in this legislation that would provide protection for that particular situation that you envision.

Mr. BIEMILLER. We are very pleased to hear that. As I go on you will notice it is one of the things that concerns us.

Mr. Chairman, this problem goes beyond the direct impact on the workers who we represent in a collective bargaining sense. We are concerned not only for our own members but for the community as a

whole, when we read such authoritative experts as Dr. M. J. Muller who writes in the current issue of the Saturday Review a startling article entitled "Race Poisoning by Radiation."

We are likewise concerned at the implications of the paper of Dr. I. Phillips Frohman to the American Medical Association, regarding the speedup of aging processes of life resulting from exposure to radiation which was read to the American Medical Association day before yesterday at their Chicago convention. Yesterday the British Medical Research Council likewise reported on the dangers of the biological effects of radiation. The New York Times of June 13 included these significant paragraphs:

> Because of the "inadequacy of present knowledge," the British Medical Research Council said, it does not feel justified in setting a safe radiation limit to which the whole population could be exposed.
>
> However, "exposure in peacetime can be maintained at levels which can be accepted by the individual without undue concern either for himself or his offspring."
>
> In its conclusions the medical council urged that the use of diagnostic and therapeutic radiology should be "critically examined" and the amounts of radiation from X-ray shoe-fitting appliances, luminous watches, clocks and also television apparatus "should be reduced as far as possible."
>
> The danger from the peaceful uses of radiation, it said, is much greater than that from the bomb in some respects.

Mr. Chairman, most overwhelming of all is the report of our own National Academy of Sciences reported in yesterday's newspapers. The implications of this report require, in our judgment, an immediate review of the regulations governing the operations of our total atomic energy program.

The present permissible exposure for the worker subject to regular radiation is 300 milliroentgen. During the Conference on the Peaceful Uses of Atomic Energy, held by the International Confederation of Free Trade Unions in Brussels August 1 and 2, 1955, our British friends advised us that their standard was one-tenth the maximum permissible under Handbook 52 of the National Bureau of Standards.

Prof. G. Hoyt Whipple of the University of Rochester in a paper read at the Nuclear Engineering and Science Congress sponsored by the engineers' joint council, last December pointed out that, and I quote:

> The recommended maximum permissible exposure of three-tenths roentgen per week has a small but significant risk for a lifetime occupational exposure. It is strongly recommended that a figure no greater than one-tenth of this be taken as the criterion for a nuclear powerplant.

Because of the serious impact which this recommendation has on costs and insurance standards, Mr. Chairman, I ask permission to insert Professor Whipple's entire presentation in the record at this point.

Representative PRICE. Without objection, it is so ordered.

(The information referred to follows:)

RADIATION HAZARD CONTROL FOR A POWER REACTOR

G. Hoyt Whipple, University of Rochester, Rochester, N. Y.

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Radiation Hazard Control for a Power Reactor

ABSTRACT

The radiation hazards associated with the routine operation of a power reactor are described and evaluated by comparison with more familiar hazards of normal life. The importance of plant design, instrumentation, and worker training to the adequate control of radiation hazards is described.

I. INTRODUCTION

This paper treats the general problems of radiation hazard control for a power reactor. Certain specific problems are considered, but the discussion is not limited to a single reactor type.

First, the general features behind the concept of maximum permissible radiation exposure will be described. Next, the sources of radiation hazard in a nuclear powerplant will be described and classified. The factors to be considered, first in the design, and second in the operation of such a plant will be discussed. Finally, a few economic aspects of radiation hazard control will be mentioned.

The practice of radiation hazard control is called health physics, and those who practice the art are called health physicists. This paper, then, concerns the health physics aspects of power reactors.

II. MAXIMUM PERMISSIBLE EXPOSURE

The maximum permissible occupational exposure recommended by the National Committee on Radiation Protection is 0.3 roentgen per week. The committee makes it clear that the concept of a maximum permissible exposure does not entirely preclude the possibility of radiation injury to the exposed individual, or to succeeding generations. It is the intent, however, that the probability of the occurrence of such injuries should be so low that the risk will be readily acceptable to the average individual. In other words, a radiation dose of 0.3 roentgen per week received week after week throughout a working lifetime is not without some risk. How great is this risk, and how does it compare with the ordinary risks of life?

For the purposes of this discussion, which is concerned with day-to-day exposures to small amounts of radiation, it will be sufficient to consider only two biological effects of radiation: Life-span shortening and genetic mutations.

It has been found from extensive animal experimentation that repeated small doses of radiation reduce the life expectancy of the exposed individuals by an amount directly proportional to the total dose. The results of this type of experiment are illustrated in figure 1. It also appears from these experiments that the fractional life-span shortening per roentgen is relatively constant among the various species of animals, at about 1 percent per 100 roentgens. It is important to note that individuals in the irradiated group die, in general, from the same causes as do the individuals in the control group; the difference is that they die a little sooner. It is impossible to assign radiation as the cause of death in any individual case.

An individual who receives the maximum permissible exposure of 0.3 roentgen each week will accumulate a total dose of 450 roentgens in 30 years. Extrapolation of the available life-span shortening data suggests that this dose will reduce the life expectancy of the exposed individual about 3 years. Is this risk acceptable to the average individual? Life-insurance statistics show that the life expectancy of the average 30-year-old white male in the United States is reduced 0.9 years by accidents of all kinds, and 1.8 years by cancer. Thus, the risk involved in a working lifetime at the exposure rate of 0.3 roentgen per week is comparable, but perhaps somewhat greater than the normal risks of life. It is evident that the risk is great enough to warrant some effort to reduce it. If the occupational exposure can be reduced to one-tenth the recommended value, i. e., to 0.03 roentgen per week, the life expectancy reduction from a lifetime of work will be about 4 months, a risk acceptable to most people.

The genetic mutations induced by radiation have given rise to considerable interest and some bitter controversy. The following statements, however, find general acceptance among geneticists. Radiation applied to the reproductive

cells of living organisms will induce changes in the genetic material of these cells. The number of these changes is in direct proportion to the amount of the dose. Genetic changes of this sort are usually detrimental. It is not possible at present to predict the exact magnitude of the genetic risk involved in any given radiation exposure, but it is estimated that a dose of between 100 and 200 roentgens to every individual in 1 generation will double the mutation burden in the next generation.

The risk of genetic mutations is not to the individual who receives the radiation, but to his children and to succeeding generations. The problem of the genetic effects of occupational radiation exposure is one of conservation: Conservation of the human race, if you will.

This brief discussion of the biological consequences of radiation exposure justifies the contention that a nuclear powerplant should be designed and operated in such a way that the plant workers are exposed to the smallest amount of radiation consistent with convenience and economy: Specifically, to justify the selection of a criterion for maximum permissible occupational exposure less than 0.3 roentgen per week. It has been shown that on the basis of present knowledge, the risk involved in a working lifetime at 0.3 roentgen per week is not insignificant. It is evidently desirable to design and operate the plant with considerably smaller exposure than this.

A number of installations have adopted one-tenth the maximum permissible exposure recommended by the National Committee on Radiation Protection, or 0.03 roentgen per week, as a working criterion, and every reasonable effort is made to reduce the average exposure below this. As an example of the results of this effort, the average exposure to all Hanford and Oak Ridge workers during 1949 was 0.004 roentgen per week, which amounts to little more than double the dose received from cosmic radiation and natural radioactive materials. The weekly average of the 10 highest exposures of Oak Ridge workers for 1949 was about 0.08 roentgen per week, roughly one-fourth of the maximum permissible weekly exposure.

III. THE SOURCES OF RADIATION HAZARD IN A REACTOR POWERPLANT

Sources of radiation to which workers in a nuclear powerplant may be exposed are shown in figure 2. This figure also serves as a crude flow sheet for the radioactive materials in the plant. Air, gases, water, and other materials are freed of radioactivity by decontamination and decay, or are diluted to the point where they can be released into the environment, i. e., released from further control. Spent fuel elements, defective equipment which has a high level of radioactivity, either induced or contaminated, the concentrated wastes, etc., are packaged, shielded, and freed of external contamination to the extent that they can be shipped out of the plant for processing or ultimate disposal.

The sources of radiation hazard in a power reactor plant are arranged in figure 2 (p. 368) according to the level of hazard, and some of the functional relations among the various components have been shown. Proper design for the control of radiation hazards begins with the recognition of the various sources of radiation and an estimation of the radiation level expected from each source. The next step is the maintenance of the differentials between the various levels.

Operation of the plant requires that materials and men pass from one hazard level to another. Maintenance of the differences between adjoining hazard levels requires certain barriers to the passage of radiation and radioactive materials between levels. In the case of fixed sources, the hazard differential will be attained by shielding. In the case of air and gases, the hazard differentials are maintained by flow rates of the proper direction and magnitude: flow in to successively higher levels, exhaust out through an adequate cleanup system before release to the stack. In the case of equipment, instruments, and other materials which are moved from higher to lower levels, the hazard differentials are maintained by decontamination, storage to allow for radioactive decay, or by packaging to contain contamination and shield radiation. In the case of plant workers, the hazard differentials are maintained by personal decontamination in a facility called a change room.

It is important to distinguish radiation and contamination. A given amount of radioactive material is considerably less hazardous when it is fixed than when it is free to move about. The hazard from fixed radioactive materials is that of external radiation, usually only the γ-radiation when the material is enclosed. Once radioactive material becomes loose, the possibility of its getting into the body by inhaling, drinking, eating, etc., arises, and the potential hazard is that of radioactive material lodged inside the body.

As an illustration: one curie of Na–24 enclosed in a tight aluminum container, with walls thick enough to stop all the Na–24 beta particles, will deliver a gamma-ray dose of 21 roentgen per hour at 1 foot. The air distance from this source at which a dose of 0.3 roentgen will be received in 40 hours is 53 feet. The volume of space which this source preempts is 620,000 cubic feet. If, on the other hand this same amount of Na–24 is dispersed as a fine aerosol, it will bring a volume of air equal to about 18 million cubic feet to the maximum permissible concentration of Na–24 ($2\times10^{-8}\mu$c/cc), i. e., about 30 times the volume involved when the material is fixed.

The γ-radiation from a fixed source is controlled by shielding and/or distance. Control of loose radioactive material is considerably more difficult because of its propensity to move about and become airborne.

It is obviously easier to design for adequate control of the radiation from fixed sources than for adequate control of contamination and airborne material. The former is a static problem; the later a dynamic problem involving traffic control.

Throughout a plant and particularly where people, materials, gases, etc., pass across boundaries between different levels, there should be radiation monitoring instruments to check on the adequacy of the control. All plant workers should be equipped with one or more types of radiation monitoring instruments, so that a continuing record of the radiation exposure can be kept for each employee. Hours of work, particularly in the higher levels should be regulated and all workers should be subjected to careful periodic medical checks, including assay of the amounts of radioactive material which they may have acquired in their bodies. In sum, all areas within the plant must be controlled.

Air, water, and other materials leaving the plant pass into an uncontrolled area. Beyond the plant fence no one wears a film badge, submits a urine sample, or follows prescribed procedures. Microorganisms concentrate radioactive wastes from waste water; fish eat the microorganisms; people eat the fish. With the exception of carefully prepared shipments, materials which enter the public domain can no longer be controlled.

The differences between the controlled areas within the plant and the uncontrolled areas which lie everywhere outside the plant give rise to what appears to be a double standard of safety. It is not uncommon to limit the exposure for people outside a radioactive installation to one-tenth of that allowed people working in the plant. It would seem from this that one intended to be 10 times as careful with his neighbors as wih his employees. Actually this is not the case. One's neighbor can remain in his house for 176 hours a week, but it is unusual for a worker to be in the plant more than 40 hours a week; one's neighborhood may include pregnant women; pregnant women are almost universally excluded from radiation work; finally, and most important, is the complete absence of control outside the plant.

It is true that off-site surveys will be made of air, water, vegetation, etc., as a check on the performance of the various cleanup systems, but this does not constitute control in the sense that it applies within the plant.

IV. FACTORS IN PLANT DESIGN

Shielding

Shielding is an art and a science unto itself, and one best left to the experts. It is sufficient here to point out that shields adequate to attenuate γ and neutron radiation by factors of 10^{-10} to 10^{-14} are required for power reactors, and that shields of this magnitude cannot be designed with a slide rule or a desk calculator. It is also worth noting that a good design is a necessary but not always sufficient condition for an adequate shield. Voids and uneven distribution of the aggregate can reduce the effectiveness of a shield considerably, and meticulous control during fabrication are important, particularly with the special heavy concrete.

Ventilation

The general rule for good ventilation practice in radioactive installations is that airflow be from areas of lower to areas of higher activity, as illustrated in figure 3. To accomplish this, the exhaust must be from the area of highest activity. Two factors prevent the application of this simple rule to the ventilation of the entire nuclear powerplant. The first of these is that the area of highest activity, the reactor itself, is so enormously active that it is not economic to clean an appreciable volume of air for release to the atmosphere. The reactor gas system will in general contain vapors, particulates, and radioactive noble

gases in concentrations that require a cleanup system of traps and filters with a transmission factor of 10^{-6} to 10^{-10} in order to permit release to the atmosphere. The expense of processing large volumes of gas in a cleanup system of this excellence will obviously be very great.

The other factor which prevents the simple one-directional airflow in a power reactor building is the necessity for keeping oxygen, nitrogen, and water vapor away from the reactor core, particularly in the case of sodium-cooled reactors.

The necessity for maintaining an inert atmosphere in the primary reactor housing, the fact that the activity is so very high inside the reactor that a single gas barrier cannot be trusted, and the high cost of cleaning heavily contaminated gas, all dictate a somewhat more complex gas-control system than is adequate in simpler radioactive installations. Such a system is shown in figure 4 (p. 369).

The innermost region represents the inert gas over the sodium which passes through the reactor core. This region is shown completely surrounded by an inert gas at a somewhat higher pressure than that over the sodium. The second region, in turn, is completely surrounded by an atmosphere, probably depleted in oxygen, at a pressure lower than either that of the region which it encloses, or that of atmospheric air. As long as the pressure profile shown in figure 4 is maintained, no radioactive material can leak out of the reactor core system, and no oxygen or water vapor can leak into the core. If the leakage into the core is kept small, the volume of gas which must be pumped out of the inner region and processed will also be small.

Filters, traps, stacks, and meterology all belong to a particular realm of the black arts. Of rules of thumb, of formulas, and of experimental data, there is a multitude, but the day has not yet come when an engineer can buy a handbook which contains the data he needs to design the gas and air cleanup systems needed for a nuclear reactor plant.

Plant layout

Radiation hazard control imposes several requirements in addition to those normally considered in plant layout. It has just been pointed out that efficient solutions to the problems of (1) adequate shielding and (2) ventilation will affect the plant layout. It is frequently possible to reduce both shielding and ventilation costs by arranging the areas of different hazard levels into concentric zones with those of highest activity in the center.

A third factor which must be considered in the plant layout is the flow pattern of plant personnel in the performance of their duties. A number of these duties will involve work in contaminated areas, areas where there may be dangerous amounts of airborne radioactive material, areas in which an inert atmosphere is maintained, or any combination of the three. The most effective arrangement is usually that where the workers enter at the lowest level and pass to areas of successively higher levels. Work in the higher levels will require one or another kind of protective equipment: Overalls, boots, gloves, respirators, supplied air masks, etc. A man leaving such an area requires the services of a change room, where he can remove and dispose of his protective equipment, check his body for contamination, decontaminate himself, or receive assistance in decontaminating himself, and generally pull body and soul together with a shower and a change of clothes.

Economies can be effected by grouping areas of similar hazard level in such a way that all potentially contaminated workers can use a single change room with the shortest possible distance of travel. The optimum arrangement for worker traffic requires careful analysis of the work which is to be done in the contaminated areas and appreciation of the fact that convenience in doing such work is not a luxury, but a continuing source of savings in the operation of the plant. Consideration should be given both to routine service and inspection and to special repair and replacement work.

Materials

The choice of materials used in construction may have a considerable effect on the radiation hazards in the plant. The radioactivity induced in most elements by neutron capture introduces a new factor into the selection of materials which will be subjected to neutron fields. Pure aluminum, for example, is a desirable material from this standpoint because the activity induced by neutron capture dies away with a 2.3 minute half-life (10^{-3} every 23 minutes). In the reconstruction of the Chalk River NRX reactor a stainless steel shield disc was replaced by an aluminum disc. The shielding properties of aluminum are inferior to those of stainless steel, but the induced activity decays away so much

more rapidly that any future repair will be greatly facilitated. A decay period of six months will reduce the activity induced in type 304 stainless steel by a 90-day neutron irradiation to only 0.01 of its initial value.

Impurities, or elements which occur in small quantities can be surprisingly troublesome after neutron irradiation. For the first few hours after removal from the reactor the major part of the radiation from 304 stainless comes from the 1-percent manganese in the steel, but after a few months, the radiation from the 0.1-percent of cobalt contributes the major part.

As a final example of the subtleties of neutron-induced activities, it is worth mentioning the tritium produced in heavy water. Tritium is a particularly difficult material to detect, measure, and control. The hazard from tritium is not that of external radiation, but of inhalation, ingestion and absorption.

The choice of surface finishes is also an important factor. The ease of decontamination varies greatly with the nature of the surface. Rough, porous surfaces are difficult to free of contamination. Unpainted concrete is particularly troublesome in this respect. The resistance of surface finishes to the harsh decontamination procedures is also important.

Flexibility

Foreseeing the unforeseeable and planning for it are difficult, but where large quantities of radioactive materials are involved it is extremely important to make allowances for the unexpected. Perhaps the best provision for the unforeseeable is to design into the plant as much flexibility as possible. It is always desirable to provide flexibility for expansion, changes, errors in design and construction, and to permit recovery from accidents. Where large amounts of radiation are involved, repair and replacement operations can be very difficult unless conditions have been provided which allow reasonable working times.

Flexibility can be very expensive in a plant of this sort. The cost of surrounding large volumes of space with heavy shielding is very great.

One of the lessons of the Canadian NRX reactor reconstruction is that a method of removing and replacing every component in the plant should be worked out in detail for the worst possible conditions, including those of high radiation fields. Another lesson is the importance of storage facilities for highly active material in the event of failure.

V. FACTORS IN PLANT OPERATION

Personnel training

The single most important factor in the control of radiation hazards in a powerplant is the attitude of everyone in the plant, from top to bottom. Careful selection will be necessary to obtain people who are equal to the responsibilities of working in the plant. Painstaking instruction in the hazards of radiation and in the protective methods and devices necessary to work safely in the plant are essential parts of the training given these men. The accident-prone, the worriers, the overconfident must be educated, or eliminated, if the plant is to be operated with a minimum risk to everyone. As in the electric power and the chemical industries, the safety of each individual depends on the training and attitude of all the workers.

Protective equipment

Work in contaminated areas, in the presence of appreciable quantities of airborne radioactivity and in inert atmospheres requires personnel protective equipment. There is a bewildering array of this type of equipment in use, and it would seem that the opportunity for new designs must be nearly exhausted. Figure 5 (p. 367) shows a man well isolated from his environment by one representative type of protective clothing.

The proper use, maintenance, and test of the protective equipment are operations of some importance. The services of a small laundry equipped specifically to decontaminate the clothing and other protective equipment are required.

Radiation instruments

Gamma, beta, and neutron radiation present potential hazard in a nuclear powerplant. In most cases, alpha radiation will present no problem. None of the five senses responds to these radiations, so it is necessary to have instruments which can detect and measure them. Radiation instruments are needed for a number of purposes:

1. To observe the radiation levels at key locations in order to detect changes which indicate trouble and to warn that entry is unsafe.

2. To determine safe working times.
3. To check on the performance of shields, filters, traps, decontamination procedures, etc.
4. To detect and locate contamination on personnel, equipment, and in the building.
5. To detect radioactivity in the plant air.
6. To measure the exposure received by each individual.
7. To monitor all materials before release: air, water, equipment, casks, etc.
8. To monitor off-site conditions (air, water, surfaces, etc.) as a final check on plant control.

Reasonably satisfactory instruments are available for all these purposes, although the devices for measuring fast neutrons and airborne radioactivity are still in a rather awkward stage.

The calibration, maintenance, and repair of radiation instruments presents certain problems in that special technical skills and special facilities are required. Whether these services should be provided by the reactor plant, or by an outside laboratory specializing in radiation instruments is a question of economics and efficiency.

Personnel monitoring

The radiation instruments needed to monitor the individual exposure of each worker in the plant have already been mentioned. In addition to these physical measurements of radiation exposure, certain biological measurements will be made. The most useful of these is the periodic analysis of the urine for radioactivity. This analysis will reveal the presence of any significant amounts of radioactive material which have entered a worker's body by inhalation, ingestion, or skin absorption. Blood counts and the regular medical examination will also be used to observe the general health of the worker, but these conventional medical tests have proved to be of limited value in regulating exposure at, or below, an exposure level of 0.3 r per week.

The permanent record of the exposure and biological data for each plant worker is an important and useful body of information. It has some legal significance, and may eventually be required by some State laws. Apart from their legal importance, these records will be useful in plant operation. Unsuspected conditions will be revealed; careless workers and inadequate supervision will be apparent; and morale will be improved by the confidence which a good personnel monitoring system produces.

Here, perhaps belatedly, the common ground between the health physics group and the medical group should be mentioned. In cases of suspected overexposure, or in the planning of work under special work conditions, the final decisions affecting the individuals concerned will be made with the advice of the industrial physician. The personnel monitoring records will be an important aid to the physician in these situations.

Waste disposal

Radioactive wastes from a powerplant will be handled in three ways: (1) Low activity liquids and gases will be diluted and released; (2) high activity materials will be packaged and shipped away; and (3) material with high-level, short-lived activity will be stored to allow decay. It should be noted that none of these methods follows the radioactive wastes from power reactors to their final resting place and that the question of the ultimate disposal of these wastes has not been answered.

Off-site monitoring

The final check on the excellence of the control of radioactive materials in the plant will be obtained by measurements in the vicinity of the plant. This off-site monitoring will include measurements of airborne radioactivity concentrations, concentrations in sewers or rivers, fall-out density on the ground and vegetation, and stray radiation intensities. Some of these measurements will be made continuously, some periodically, and some only occasionally. They may be made by the plant organization, by the local public health authorities, or by some commercial agency.

This monitoring will have great public-relations value, quite apart from its importance to health and safety. In this connection, it is important that measurements of this kind be made for some time before the plant goes into

operation to provide background data on the surroundings. Otherwise every radioactive disintegration in the vicinity will be attributed to the operation of the plant.

VI. SOME ECONOMIC ASPECTS OF RADIATION CONTROL

The control of radiation hazard will add significantly to the total cost of buildings and operating a nuclear powerplant. Consequently every item of control must be examined critically to determine whether it is essential to the proper operation of the plant, or whether it is justified on grounds of plant efficiency.

The cost of designed-in control and safety must be evaluated in terms of the savings they will permit in operating costs. Construction costs are paid only once, but operating costs will be paid throughout the life of the plant.

Suppose that a piece of equipment has failed in an area of high radiation levels, and that replacement of the equipment will require 2 man-hours of work in an area where the radiation level is 10 roentgens per hour. Suppose also that the policy for special work conditions in the plant permits a man to receive up to 2 roentgens in a single exposure, provided that he is removed from radiation exposure for a period of 13 weeks. Under these conditions the replacement job can be done with a minimum of 10 men, each receiving 2 roentgens in a 12-minute work period. For the next 13 weeks these 10 men will be excluded from radiation work. If there is no radiation-free work in the plant for these men to do, the cost of the replacement job can be as high as 2½ man-years.

The proper plant design is the one which reduces the frequency at which failures in high radiation areas will occur; it will reduce both the time and dose rates required to make these replacement; and, finally, proper plant design will keep a large portion of the plant at sufficiently low radiation levels to permit radiation-free work by men who have received special work exposures.

Another economic aspect of radiation control which should be considered is legislation. Many States are considering legislation for the regulation of radioactive materials. Such legislation may not be desirable, but almost inevitably regulation and inspection in one form or another will be a part of nuclear powerplant operation. Failure to take this into account in designing the plant may make the plant operation very cumbersome when such regulations are put into effect.

VII. SUMMARY

The recommended maximum permissible exposure of 0.3 roentgen per week has a small but significant risk for a lifetime occupational exposure. It is strongly recommended that a figure no greater than one-tenth of this be taken as the criterion for a nuclear powerplant. Proper regard for the control of radiation hazards in the plant design will reduce the risks to employees and will also reduce operating costs.

Mr. BIEMILLER. Workers in the atomic-energy plants advise us that the safety of the present program has been so oversold that the hazard has been minimized and some workers do not even wear the film badges which would reveal the true extent of the radiation level to which they have been exposed.

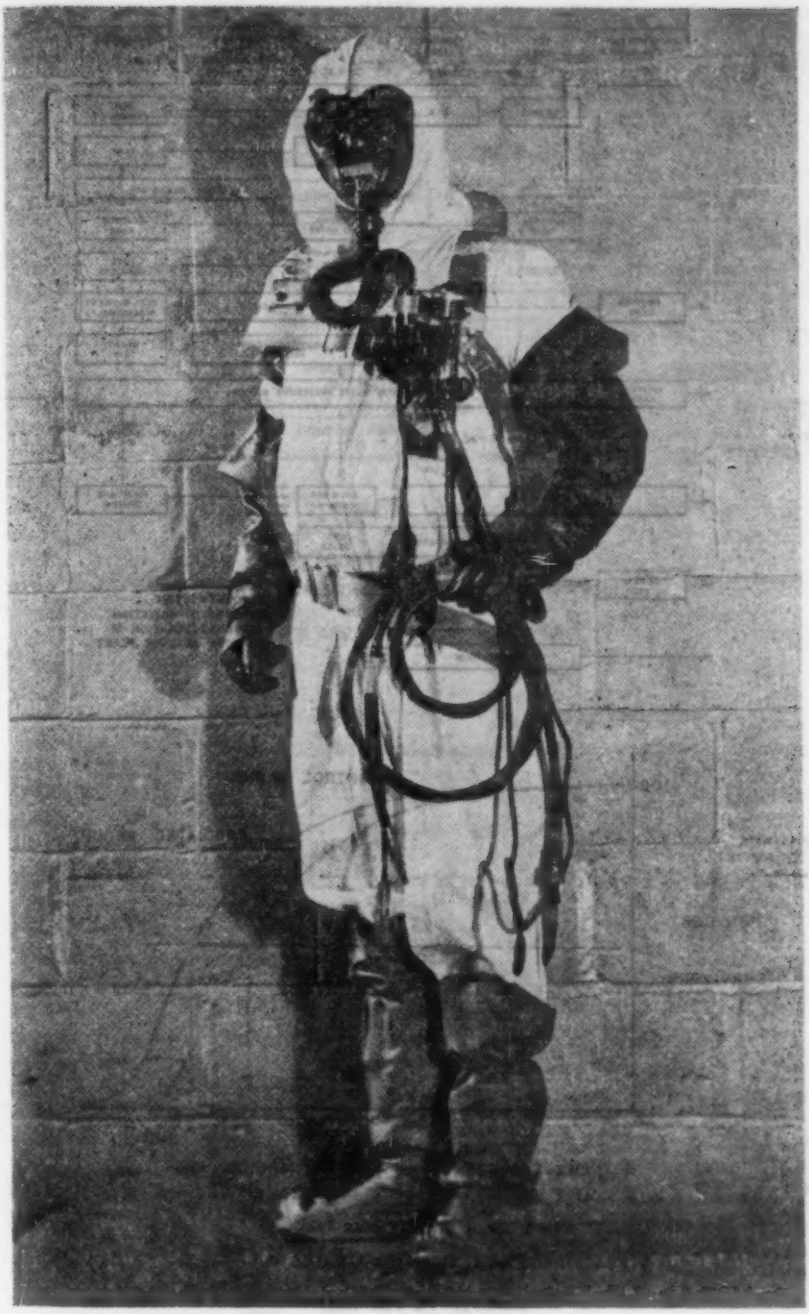
Representative COLE. Do you have any information with respect to locations where persons who should wear film badges are not being required to wear them?

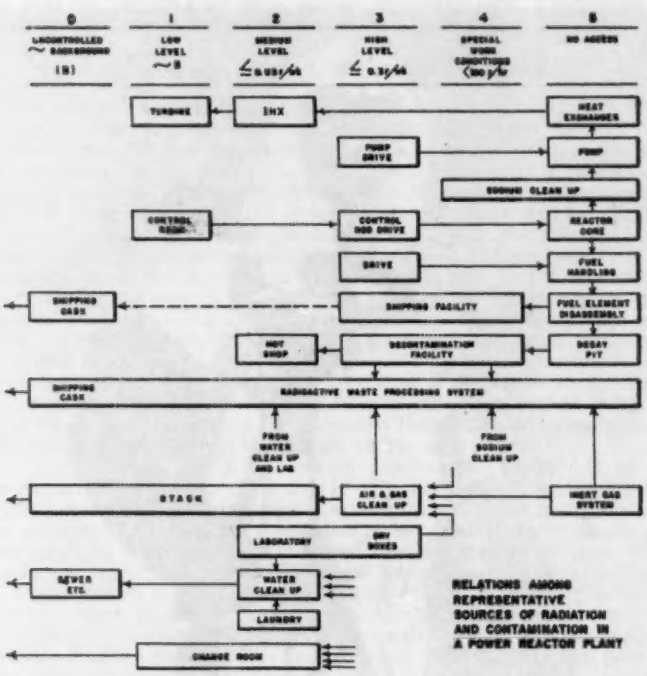
Mr. BIEMILLER. I do not think we ought to reveal that on the record. These are reports that come to us from our people. I would be glad to discuss it with the staff at sometime.

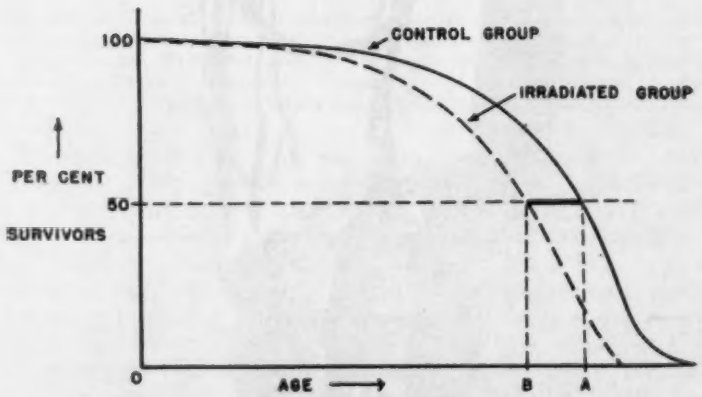
Representative COLE. I will be guided by your judgment.

Mr. BIEMILLER. We will do that.

Yet in the face of this serious threat to the well-being of hundreds of thousands in this generation and potentially of their progeny in future generations, the United States Department of Commerce has circulated a suggested model bill leading toward State control and away from Federal standards but with a requirement only for cooperation with other agencies among which is the Federal Government.







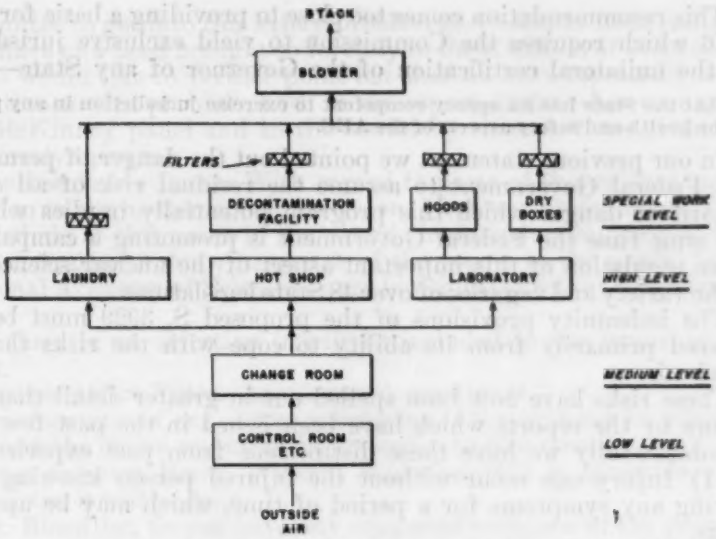
A - LIFE EXPECTANCY OF CONTROL GROUP
B - LIFE EXPECTANCY OF IRRADIATED GROUP

LIFE SPAN SHORTENING = A-B

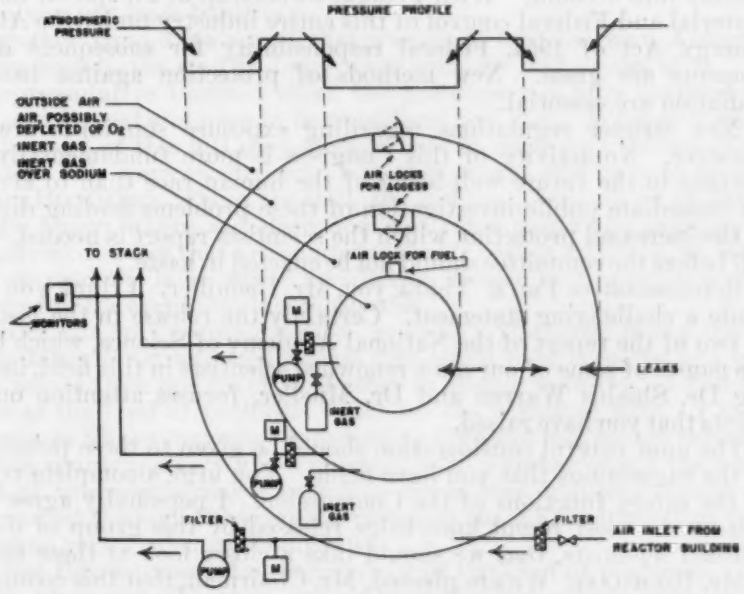
FRACTIONAL LIFE SPAN SHORTENING = $\frac{A-B}{A}$

$\frac{A-B}{A} \approx 1\%$ PER 100r

TYPICAL RESULTS OF AN EXPERIMENT ON THE LIFE-SPAN SHORTENING PRODUCED BY IRRADIATION



VENTILATION BY FLOW FROM AREAS OF LOWER ACTIVITY TO AREAS OF HIGHER ACTIVITY



SCHEMATIC OF A REACTOR GAS SYSTEM

This recommendation comes too close to providing a basis for H. R. 8676 which requires the Commission to yield exclusive jurisdiction on the unilateral certification of the Governor of any State—

That the State has an agency competent to exercise jurisdiction in any portion of the health and safety aspects of the AEC.

In our previous statement we pointed out the danger of permitting the Federal Government to assume the residual risk of all of the hazard of danger which this program potentially implies while at the same time the Federal Government is promoting a campaign to leave regulation of this important aspect of the nuclear science field to the variety and vagaries of over 48 State legislatures.

The indemnity provisions of the proposed S. 3929 must be considered primarily from its ability to cope with the risks that are involved.

These risks have now been spelled out in greater detail than ever before by the reports which have been issued in the past few days. Fundamentally we have these distinctions from past experience:

(1) Injury can occur without the injured person knowing it or having any symptoms for a period of time, which may be up to 30 years.

(2) The weakest of the radiations, a single alpha particle, may cause cancer.

(3) Radiation dosages are cumulative and add to exposure by X-ray and fluoroscope.

(4) Exposure has genetic effects and is particularly harmful to the childbearing portion of the population.

It is clear that present laws, Federal and State, do not take these factors into account. With Federal ownership of all special nuclear material and Federal control of this entire industry under the Atomic Energy Act of 1954, Federal responsibility for subsequent developments are great. New methods of protection against harmful radiation are essential.

New stricter regulations regarding exposure standards are imperative. No activity of this Congress is more fundamentally important to the future well-being of the human race than to arrange an immediate public investigation of these problems leading directly to the increased protection which the scientists report is needed. The bill before the committee should not be enacted in haste.

Representative PRICE. Thank you, Mr. Biemiller. I think you have made a challenging statement. Certainly the release in the last day or two of the report of the National Academy of Science, which bears the names of some of our most renowned scientists in this field, including Dr. Shields Warren and Dr. Mueller, focuses attention on the points that you have raised.

The most careful consideration should be given to these points and to the suggestions that you have made. You urge a complete review of the safety functions of the Commission. I personally agree with you on the most recent knowledge released by this group of distinguished scientists, that we should take a closer look at these things.

Mr. BIEMILLER. We are pleased, Mr. Chairman, that this committee has from time to time seen fit to investigate some of the working conditions and problems. For example, the investigation of housing problems. We think it certainly is well within the province of the

committee to get into this safety problem and hazards from radiation that have now been brought so forcibly to the attention of everyone.

We would like to further point out that we have repeatedly called attention to this problem, both in the report of the labor seminar of the McKinney panel and in the testimony that we have given here previously this year.

Representative PRICE. With regard to parts of this subject and its relation to the matter under discussion, I ask unanimous consent that we include at this point in the record the introduction, part I, from page 1 to page 9 down to part 3 of the report to the public by the National Academy of Sciences on the biological effects of atomic radiation.

If there is no objection it will be included in the record at this point.

Representative PRICE. Are there any questions?

Representative COLE. I was wondering if it might not be advisable to insert the entire report as an appendix to this record.

Representative PRICE. Without objection, if it is agreeable to the committee, it will be done.

Mr. Biemiller, do you have any suggested revisions of the proposed legislation, S. 3929, or any comment specifically on the bills under consideration?

Mr. BIEMILLER. The problem as we see it after discussions with our counsel, is that we are fearful—(*a*) that the worker is going to get lost in the shuffle. While there is a laudable aim to protect the community as a whole, the worker is going to find himself on the wrong end of anything that may happen, and (*b*) we are not convinced that there has been sufficient attention paid to the radiation hazards over and above just basic liability.

I gather from a statement that was made by Chairman Anderson before he left, the staff is doing some work on that aspect of it.

Representative PRICE. I think the problems you have outlined are real and factual and have to be considered and met. With or without the passage of this bill they must be met in some way. Even if one of these bills were enacted into law, they would still have to be met.

Mr. BIEMILLER. There are still, for instance, some 13 or 14 States in the Union where radiation does not come under the category of industrial diseases that are compensable. There is no State, as far as we can read the laws, where a radiation disease that appears several years after the event that is compensable.

There is a very serious question as to how you could define the responsibility for a radiation disease that might have occurred to a man who moves from one plant to another in atomic industry. I just cite these as the kind of problems which we are wrestling with. I think there is, as I have suggested in testimony here and in speeches throughout the country, a very grave question as to whether or not the whole field of workmen's compensation in the atomic industry should not be handled through the licensing power of the AEC rather than relying upon very inadequate State laws.

I just throw those out as suggestions of the kind of problems.

Mr. GOODMAN. There is one additional point which ought to be brought out in relation to the adequacy of the bills pending before you. That is, that the latent nature of some of the damage cannot

be adequately met in the present bill. Some of these damages may not show for 30 to 35 years.

Representative PRICE. It was the intent, at least, of the legislation to cope with that type of situation. As a matter of fact, on page 7 of the proposed Senate bill, starting on line 17, there is contained this wording:

> The Commission shall have authority to settle or approve the settlement of claims without regard to the rules of legal liability in the State of the accident, and regardless of whether liability has been established by the judgment of any court.

This would try to do it specifically. Whether it does or not, if you have any comment to make on it, it would be helpful.

Mr. BIEMILLER. What you are saying is in effect, for all practical purposes, the Federal Government is taking over the entire risk.

Representative PRICE. No; we are saying we are taking over the risk beyond which private companies cannot go.

Mr. BIEMILLER. Yes; but you are endeavoring in this language to take over certain situations in which existing law would not permit normal procedure.

Representative PRICE. We are trying to avoid legal technicalities and making it flexible enough so that these types of damages could be dealth with.

Mr. BIEMILLER. We would like to see the same effort applied to the problem of the worker in the atomic industries, too, because he is running into this same question.

Representative PRICE. I think in effect it would in some way favorably affect him, too.

Mr. BIEMILLER. If this is a peculiarly hazardous industry, and obviously that is taken for granted by the very fact that these bills are introduced at all, it means it is a particularly hazardous industry for the worker as well as for the community.

Representative PRICE. I think we all recognize that.

Mr. BIEMILLER. Take the State of Idaho, for example.

Representative PRICE. We recognize that. The principle behind this bill was to take care of the third-party liability.

Mr. BIEMILLER. Yes.

Representative PRICE. The unforeseeable damage liability that we hope will never happen. The worker is protected under the ordinary provisions of law and existing insurance programs. At least we hope he is. We want to be certain that he is.

Mr. BIEMILLER. That is the point I was just starting on a moment ago, Mr. Chairman. In the State of Idaho, which is obviously going to be the scene of a part of the atomic industry, in the first place, the worker has no protection against radiation disease and in the second place the top settlement that can be obtained for death is $10,000.

I would assume that under the bill that you have here, if it ever became law, and an unfortunate accident should occur, you will have judgments far beyond $10,000 out of third-party suits. If this is a peculiarly hazardous industry for the community, it is certainly peculiarly hazardous to the worker both in terms of radiation and in terms of death.

He cannot collect on any radiation claims in that State under workmen's compensation.

Representative PRICE. We recognize the problem. We certainly are hoping to suggest a recommendation to try to bring forth adequate protection, not only for the public but for the individual worker in the installation.

Mr. BIEMILLER. We have just set up a new staff committee on atomic energy and natural resource problems in the AFL–CIO. We are going to continue to accumulate this material. You can rest assured that we will be back here a lot of times with ideas and suggestions in trying to get this going, because we are very concerned.

Representative PRICE. Certainly our staff will be glad to work with your representatives at any time on any suggested provisions that might be helpful and that should be considered while we are working on this legislation.

Are there any questions?

If not, thank you very much.

Mr. BIEMILLER. Thank you for the opportunity to be heard.

Representative PRICE. Our next witness is Mr. Donald H. Dunham, director retirement, safety and insurance department, National Rural Electric Cooperative Association.

STATEMENT OF DONALD H. DUNHAM, DIRECTOR, RETIREMENT, SAFETY, AND INSURANCE DEPARTMENT, NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION

Mr. DUNHAM. Mr. Chairman and gentlemen of the committee; my name is Donald H. Dunham, I am director of the retirement, safety and insurance department of the National Rural Electric Cooperative Association. NRECA is the national service organization representing 91 percent of the operating rural electric systems in the United States, including Alaska.

These systems serve about 3,722,100 farm families.

Three of our member cooperatives have submitted current proposals under AEC's small scale program. In the future many more cooperatives will turn to this source of power. The three cooperatives are:

(1) Rural Cooperative Power Association, a federated generation and transmission cooperative at Elk River, Minn., which submitted a proposal for a 22,000 kilowatt boiling water reactor.

(2) The Wolverine Electric Cooperative, a federated generation and transmission cooperative at Big Rapids, Mich., which submitted a proposal for a 10,000 kilowatt aqueous homogenous reactor, and

(3) Chugach Electric Association, Inc., a distribution cooperative of Anchorage, Alaska, which submitted a proposal for a 10,000-kilowatt sodium-cooled, heavy water moderated reactor.

These rural electric cooperatives are in some of our highest cost power areas. These high power costs, of course, account in large part for the keen interest of our system in atomic power.

Since it is the responsibility of our Department to assist our member rural electric systems in securing adequate insurance protection at a reasonable cost, I appreciate the opportunity afforded by the joint committee to appear before you to discuss H. R. 11242, as introduced by Congressman Cole on May 16, 1956, and the more recent bill S. 3929, introduced by Senator Anderson, the chairman of this joint committee, and now, H. R. 11523, as introduced by Representative

Price on May 29. The latter, I believe is a companion bill to Senator Anderson's bill.

COMMENTS ON H. R. 11242

We have strong objections to various portions of H. R. 11242, as introduced by Congressman Cole on May 16, 1956. We wish to note in the record that we are appreciative of the fact that Congressman Cole and the original bill by Congressman Price were starting bills and were attempts to get a bill that would be feasible and get something started.

Subsection (a) (3) states the liability covered shall be only that which is in excess of the amount of nongovernmental insurance against such liability generally available on the open market without consideration being given for the excessive costs of such protection.

Apparently this subsection would require a reactor operator either to buy the total amount of private insurance available on the open market or else if the cost were so excessive accept a gap in the public liabiltiy coverage amounting to the difference between that private insurance which he could afford to buy and the total amount available before assumption of risk by the Government. This certainly would not result in complete protection for the public in such instances and we could not favor this type of arrangement.

We have strong objections of subsection (a) (6), which would eliminate Government liability in accidents caused by bad faith, willful misconduct, or gross negligence. Although the public would expect to be compensated should a catastrophe occur therefrom, we feel the Government indemnity should definitely protect the public against the hazards of accidents arising from these causes. The public certainly would not differentiate as to whether the accidents were due to willful misconduct or some unforeseen cause.

The wording of subsection b, paragraph 1, leaves us with the impression that if the scale of premiums charged were based on those charged by private insurance companies for the facilities involved and if projected on a similar basis, could make the cost prohibitive to the utilities.

We also feel that if the charges were thus established they would certainly include reserves to build up an indemnity fund, because insurance premiums include such a fund in their rate bases.

We certainly do not wish to put AEC into the insurance business.

I feel that the committee recognizes that the private insurance industry is not in a position to provide insurance to permit non-Federal atomic power projects to proceed at the present time. Although insurance pools are now established, to provide as much as $65 million per plant in public liability coverage, I wish to reiterate that the rates for this insurance are not yet established.

COMMENTS ON S. 3929

In reference to reactor power liability possibilities, we stated in previous testimony that we agreed with the chairman's letter of April 26 on Government indemnity if a reasonable definitive line is established offering a combination of insurance protection and Government acceptance of liability which leave the utility paying a reasonable rate for insurance protection.

The National Rural Electric Cooperative Association feels that as a whole Senator Anderson's bill S. 3929, and after reading Congressman Price's bill, we also feel since the wording appears to be identical that it will give our rural electric cooperatives the protection they need at the cost they can afford.

We feel that section 170, subsection (b), will require the Commission to take into consideration the total amount of insurance available from private sources, the cost of such insurance, the type, size, and location of the facility involved and the type of ownership of the facility as to whether it is private, public, profitmaking, or nonprofitmaking such as our rural electric cooperatives.

We note what we feel is an inconsistency in the wording of S. 3929 in that section 170, subparagraph (c), line 3 on page 4 of the bill states:

> The Commission shall execute such a contract of indemnification with the licensee * * *

whereas, in subparagraph f, line 12:

> * * * the Commission is authorized to reduce the charge set forth above, taking into consideration * * *.

We feel that this portion should read:

> The Commission shall reduce the charge set forth above, taking into consideration * * *.

It is our feeling that the Commission should be committed to reduce the charge if the type and location of the facility involved, the amount and type of fuel, the purpose for which the facility is built, and the ownership of the facility, whether a private, public, profitmaking, or nonprofit organization, is to be in a position to develop, operate, or produce the necessary facilities for development of reactor power.

We also feel that the time limit as presently set for August 1, 1966, is adequate for the insurance industry to set up creditable experience ratings and premiums and at that time a complete new evaluation should be made of the situation.

CONCLUSION

After reading Senator Anderson's bill and Representative Price's bill, we feel that it more nearly meets the needs of those who will be developing reactor power than any bill presented heretofore.

We feel that this committee has developed legislation which will meet our needs. We believe it is in the national interest as well as in the rural interest to encourage the passage of this bill since we feel it will aid in the rapid development of an atomic power industry in this country. We are anxious for our systems to be in a position to move forward rapidly in their atomic-energy development.

Representative PRICE. Thank you very much, Mr. Dunham. You made a very clear presentation of your position on this matter.

Mr. Cole, do you have any questions?

Representative COLE. No.

Representative PRICE. Thank you very much. We appreciate your cooperation with the committee.

Mr. DUNHAM. Thank you, sir.

Representative PRICE. The chairman has a letter here from the Atomic Energy Commission dated June 13, correcting the basis of Dr.

Libby's testimony as to estimates of possible damage (pp. 52–53) in the remote event of nuclear accident which I would like to insert in the record at this point.

The letter indicates Dr. Libby was talking about thermal kilowatts rather than electrical kilowatts. Since considerable of our discussion throughout the hearings was based on the understanding we were talking about the damage to a 100,000 electrical kilowatt nuclear plant, the possible damage figure would have to be increased as the ratio of electrical to thermal kilowatts is about 1 to 4.

However, we have felt that the maximum 100 percent fission release figure is unrealistic since a reactor in all cases would be enclosed in reinforced containers and in many cases in a pressure vessel. I plan at a later time to request AEC for a more comprehensive report on damage caused by nuclear runaways.

(The letter referred to is as follows:)

UNITED STATES ATOMIC ENERGY COMMISSION,
Washington, D. C., June 13, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR SENATOR ANDERSON: Dr. Libby's testimony before the joint committee on May 15, 1956, regarding possible damage from a reactor catastrophe, included estimates based on various sizes of reactors.

As indicated in Mr. LaPlante's letter of June 4, 1956, to Mr. Ramey, the figures which he used referred to thermal kilowatts. Discussions of reactor hazards are generally in terms of thermal output because of the many reactors such as research and experimental reactors with no electrical output. Mr. Ramey has indicated that since the figures may have been taken to represent electrical kilowatts, some indication should be given of possible property damage figures using the same assumptions for reactors more comparable in size to the larger power facilities now being planned.

Based on the same assumptions as stated in Dr. Libby's testimony including the use of average census values for several types of locations and assuming a release of 1 percent of the fission products from a 100,000 electrical kilowatt facility (at an arbitrary conversion ratio of 1 to 4, equaling 400,000 thermal kilowatts) the range of property damage might be in the order of $2 million to $8 million. In the extremely remote possibility of release of 100 percent of the fission products from such a facility, the range of damage might be in the order of $130 million to $600 million. Comparable estimates for a 200,000 electrical kilowatt facility (800,000 thermal kilowatts) for a 1 percent release might be in the order of $4 million to $15 million and for a 100 percent release $180 million to $900 million.

As Dr. Libby pointed out in his testimony:

"To give proper perspective to these data, one must reiterate that the probability of a major reactor failure, although currently indetrminate, is vanishingly small, and that the essential integrity of containment structure can probably be assured by conventional engineering design and construction. Even containment systems which are less than perfect are highly desirable. Looking at it pessimistically we might expect a release of 1 percent of the fission products in the event of a reactor failure.

Sincerely yours,

K. E. FIELDS, *General Manager.*

Representative PRICE. Also, without objection, the statements from the following organizations will be included in the record:

Commonwealth Edison Co., Willis Gale, chairman, also the letter from Isham, Lincoln & Beale, counselors at law, Edward M. Bullard (this letter addressed to Mr. Willis Gale, Commonwealth Edison Co.)
Consolidated Edison Co., H. R. Searing, chairman of the board
Westinghouse Electric Corp., Charles H. Weaver, vice president
General Electric Co., Frank K. McCune, vice president and general manager, atomic products division

Home Insurance Co., Kenneth E. Black, president
American Gas & Electric Co., Philip Sporn, president
Pennsylvania Power & Light Co., Charles E. Oakes, president
Yankee Atomic Electric Co., William Webster, president
New England Power Service Co., D. G. Allen
Consumers Public Power District, R. L. Schacht, general manager
Sylvania Electric Products, Inc., Walter E. Kingston, general manager, atomic energy division
Atomic Law Institute, Bigelow Boysen, director
American Public Power Association, William S. Peterson, president
National Coal Association, Tom Picket, executive vice president
Association of Casualty and Surety Companies, Ray Murphy, general counsel
National Association of Insurance Brokers, Inc.
Associated Factory Mutual Fire Insurance Companies, Ambrose B. Kelly, general counsel
Bureau of the Budget, Percival Brundage, Director
American Law Division of the Library of Congress, Frank B. Horne.
United States Atomic Energy Commission, K. E. Fields, general manager

(The statements above referred to follow:)

COMMONWEALTH EDISON CO.,
Chicago, Ill., June 11, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States,
Washington, D. C.

DEAR SENATOR ANDERSON: This letter is written in response to your letter of May 31 and telegram of June 2 relating to the hearings scheduled for June 13 and 14 on the atomic energy indemnity and insurance matter.

I desire to make my response direct and unequivocal. S. 3929, which you introduced, provides, in my opinion, exactly the needed solution to the insurance problem. I endorse it without qualification.

The major virtues of this bill are:

1. It meets the objective of indemnity over and above the amount of private insurance required. It also limits liability to the sum of the private insurance and governmental indemnity.
2. It gives the Commission the responsibility for providing a formula to determine the necessary amount of primary financial protection required, thereby putting the responsibility for safeguards and financial protection in the same hands.
3. The provision for a charge for indemnification seems reasonable and direct.

I enclose a copy of a letter to me from our counsel which suggests a few clarifications in the language of the bill. These have been discussed informally with your committee staff.

Thank you again for the consideration you have given us in this matter.

Sincerely yours,

WILLIS GALE, *Chairman.*

ISHAM, LINCOLN & BEALE,
Chicago, June 11, 1956.

Mr. WILLIS GALE,
Chairman, Commonwealth Edison Co.,
Chicago, Ill.

DEAR MR. GALE: We have reviewed the bill (S. 3929), introduced in the United States Senate, which would amend the Atomic Energy Act of 1954, as amended, by providing for indemnification by the Government against public-liability claims, within specified limits, arising out of radioactive hazards incident to the construction or operation of a production or utilization facility.

It seems to us that the bill provides, overall, a sound and workable governmental indemnity plan. Our only question would be whether at a number of points in the bill the intent is expressed as unambiguously as it might be. Certain changes which we would suggest are indicated below:

Lines 5 to 10, page 2: "(8) [except to the extent that the United States shall have granted indemnity as provided in section 170 of this Act,] the licensee will

hold the United States and the Commission harmless from any damages resulting from the use or possession of special nuclear material by the licensee, *but only to the extent of the financial protection required to be provided by such licensee under the provisions of subsection 170b.*"

The suggested change represents an affirmative treatment. Dealing with the matter by way of exception appears to us to leave some doubt as to the real intent.

Lines 20 and 21, page 2: "as the Commission shall [determine to be reasonably adequate] *require in accordance with subsection 170b* to cover public liability claims arising out of or".

The purpose of this change is to eliminate possible inconsistency as between subsections a and b of section 170.

Line 2, page 3: "indemnities, [self-insurance,] *proof of financial responsibility,* or a combination of such".

The term "self-insurance" might be construed as requiring some formal self-insurance plan backed by reserves, a requirement which we assume is not intended.

Line 12, page 3: "c. The Commission shall, [until August 1, 1966,] *with respect to licenses issued prior to August 1, 1966,*".

This wording seems more in line with the intent indicated by the last clause of subsection c.

Line 24, page 3: "property damage, [including] loss of use of *property,* which is in".

Without this change, the indemnity might be construed to cover loss of use only where specific property had actually been damaged. The suggested change is designed to cover loss of use of property where, for example, its evacuation was required because of radioactive contamination of some kind even though the property itself had not been damaged.

Line 1, page 4: "not to exceed $500,000,000 *for all indemnities* in the aggregate for each".

The purpose of this change is to make it clear that the $500,000,000 figure does not include the amount of nongovernmental financial protection required to be procured.

Lines 9 and 10, page 4: "facility because of [activities of the indemnitee] *incidents occurring* during the period of the license."

The thought is that damage might occur other than as a direct result of activities of the indemnitee and might also occur because of activities of one or more indemnitees prior to the commencement of the period of the license.

Lines 20 to 24, page 5, and lines 1 to 6, page 6: Although we are not now prepared to suggest specific wording, we feel that this provision should be revised and amplified in order to accomplish its basic objective, that is, the equitable apportionment of funds in cases where the total amount available for distribution is insufficient for the payment of all claims in full. We suggest that, in general, clear provision be made whereby the appropriate Federal court, upon application by the Commission or any indemnitee and upon a showing of reasonable likelihood that total claims will exceed the aggregate amount of private financial protection and governmental indemnity, shall take exclusive jurisdiction over the apportionment of funds and the payment of claims, including power to stay the execution of judgments and the making of payments pursuant to settlement, but without deprivation, however, of the jurisdiction of State courts or other Federal courts to hear damage cases and to determine the amounts of damages actually sustained.

We have had no serious doubts as to the constitutionality of the limitation of liability feature of the bill in general, but in this connection it is obviously important that the bill provide a workable means for equitable treatment of claimants so as to preclude questions of due process of law from the standpoint of remedies and procedure.

Very respectfully yours,

ISHAM, LINCOLN & BEALE,
By EDWARD M. BULLARD.

CONSOLIDATED EDISON CO.,
New York, N. Y., June 7, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Washington, D. C.

DEAR MR. CHAIRMAN: Thank you for your letter of May 31 inviting comments on S. 3929 and H. R. 11242.

In my opinion either of these two bills will meet the substantive issue of liability protection. I am somewhat inclined to favor S. 3929 simply because its administration would appear to involve fewer complications.

Relative to S. 3929, I suggest that the wording of the proposed section 170c be conformed to the wording of the proposed section 170d, to make it clear that only the Commission's authority to make new agreements expires on August 1, 1966, and not its authority to carry out agreements made prior to that date.

Respectfully yours,

H. R. SEARING, *Chairman of the Board.*

WESTINGHOUSE ELECTRIC CORP.,
Pittsburgh, Pa., June 11, 1956.

Hon. CLINTON P. ANDERSON,
Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SENATOR ANDERSON: In your letter of May 31, 1956, you have asked for comments on S. 3929 and H. R. 11242 dealing with the indemnity and insurance problem. I know that careful thought went into the preparation of both bills.

I believe that S. 3929 sets a satisfactory pattern and contains the more desirable features. One important feature is the degree of flexibility afforded in determining the amount of financial protection which is the point where the Government indemnity begins. It also assures the public of coverage in the area below that point. This flexibility appears necessary for the present because of the uncertainty of the cost of insurance and because of the difference in degree of risk, size of the operator, and nature and use of the particular project. Such variable factors should affect the point at which Government indemnity takes over.

Under H. R. 11242, the indemnity would begin only at the point where the amount of nongovernmental insurance generally available on the open market left off. This is now generally considered to be $65 million. This seemed unsuitable for smaller projects, research projects, and certain types of operators. S. 3929 permits the indemnity to begin at a lower point if appropriate factors are present. On the other hand, the Commission might construe S. 3929 as permitting a higher point because the total amount of insurance is expressed as merely one criterion to be considered and not a ceiling. I suggest that this point be clarified and that the financial protection required not be in excess of the available insurance.

Under S. 3929, the parties associated with a project will know the limit of liability for that project at the time a license is issued, a certainty which should assist planning.

In addition, S. 3929 recognizes the Government contract problem. It is logical that contractors and the public should be protected against the hazards of reactors operated by the Government to the same extent as in the case of privately operated reactors. More specifically in this connection, I assume that contracts with the military departments in the atomic-energy field will expand in number and scope. All three departments are already involved. In most cases the Government itself will be the operator and the problem would be related solely to the indemnity of contractors and subcontractors for development or supply of nuclear powerplants and components.

S. 3929 provides authority for the Commission to indemnify its contractors. I believe the committee should consider including similar authority for the military departments. Such authority as in the case of the Commission, should clearly be stated to be in addition to any other authority.

The committee's staff has suggested that where section 170d now provides that indemnity agreements shall apply to contracts financed in whole or in part by the Commission that the word "contracts" be changed to "projects." This suggestion was based on the thought that the Commission is a party to the major military projects and that the necessary indemnity to cover military department contractors in this area could then be extended by the Commission. If the committee accepts only this change, it would be desirable also to change the last word in subsection (d) from "Commission" to "United States." This would be necessary because the entire subsection relates only to agreements with the Commission's own contractors. If funds were provided to the Commission by a military department, the entire section might be inapplicable because the contract was not financed by the Commission.

It would be preferable, however, to provide direct authority to the military departments, or, if necessary, for a delegation of authority by the Commission to the military departments because those departments will be directly contracting for a variety of equipment related to their nuclear projects, particularly when the production stage is achieved.

The indemnity on licensed projects extends during the period of the license which, of course, is coextensive with the operation of the facility. There may be some doubt in connection with the Government contract field from the wording of S. 3929 as to whether the indemnity similarly extends for the life of the facility and survives the construction contract. A direct statement to this effect would be helpful.

With the minor modifications discussed above, I believe in S. 3929 offers satisfactory solutions to the insurance problem and is an appropriate pattern for the Government indemnity. With such authority, properly administered, the Commission should be able to remove the major existing hindrance to civilian undertakings.

We are most appreciative of the diligent efforts of the committee to understand and resolve the insurance problem. If there is any further help which can be rendered by our corporation, please let me know.

Sincerely yours,

CHARLES H. WEAVER, *Vice President.*

GENERAL ELECTRIC CO.,
Schenectady, N. Y., June 4, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Washington, D. C.

DEAR SENATOR ANDERSON: Thank you for your note of May 31. The committee has done a wonderful job in handling the indemnity legislation.

We believe that S. 3929, prepared by the committee staff, is a sound and workable solution of the atomic liability problem. In our view it is very much preferable to the Commission proposal, H. R. 11242.

We plan to discuss with the staff some ideas on the details of S. 3929 and to submit in connection with your hearings a memorandum stating our reasons for preferring S. 3929 and commenting on a few of its provisions.

Very truly yours,

FRANK K. MCCUNE.

GENERAL ELECTRIC CO.,
ATOMIC PRODUCTS DIVISION,
Schenectady, N. Y., June 13, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Washington, D. C.

DEAR SENATOR ANDERSON: On June 4 I replied to your May 31 letter stating our belief that the principles of S. 3929, introduced by you and prepared by the committee staff, constitute a sound and workable solution to the atomic liability problem. As I am sure you know, my opinion has not changed; this problem continues to be a major unsolved obstacle. The committee's action in coming to grips with it has been extremely encouraging, and I am sure I speak for every major participant in this new industry when I express the hope that speedy action will be taken along the lines of S. 3929.

Your May 31 letter requested comments on both S. 3929 and H. R. 11242. The remainder of this letter will be devoted to this purpose.

I believe that the net of the testimony received by the committee established certain objectives.

1. To provide for the public a certainty of protection and thereby win public acceptance of the new industry.

2. To require industry to bear a reasonable share of the liability, to establish its financial capacity to meet that liability, and hence to provide incentive for safety.

3. To avoid administrative complexities.

The proposals embodied in S. 3929 generally satisfy these criteria. I believe that it is the intent of H. R. 11242 also to meet these criteria but I would like to point out the following differences.

Under S. 3929 the Commission must, with respect to non-Government facilities, require of the licensee financial protection to cover the first tier of liability. H. R. 11242 contains no such provision. While the Commission may already have this power under existing law, I think it desirable that Congress state clearly its intent in this matter and that provision for proof of ability to satisfy claims be mandatory rather than discretionary.

Under S. 3929 the public will have the unquestioned benefit of the indemnity. As I understand H. R. 11242, the public's protection would depend on the licensee's decision as to whether it is willing to pay for indemnity coverage and on the amount it is willing to pay for such coverage. This appears to me a rather serious defect in the latter bill. Also, as I understand H. R. 11242, it would deny to the public the benefit of the Government indemnity in a case where the harm was caused by bad faith or willful misconduct even of a plant superintendent. This seems clearly inconsistent with the principles generally advocated.

Entirely apart from the moral consideration which must always be of overriding importance, I would like to point out that a major purpose of this bill is to gain public support at the local and State level, based on an absence of fear, without which neither technical efforts nor the appropriation of money will advance the art to its fullest extent. Hence, the importance of this legislation.

Also it is my belief that S. 3929 possesses the advantage of greater administrative simplicity. It does not involve a reinsurance scheme which would require setting up governmental machinery to establish rates and to negotiate, prepare, issue and administer reinsurance agreements and it avoids the complications of a Federal atomic hazard indemnity fund.

Finally, S. 3929 covers Government-owned and privately owned facilities and obviously those in which there is some degree of joint ownership. H. R. 11242 does not protect the public in the Government area and hence does not meet the criteria of impartiality as to either method of progressing the usefulness of atomic energy.

I am attaching, for the consideration of your staff, a memorandum of our counsel commenting on specific provisions of S. 3929. These comments are, I believe, self-explanatory and have to do with optimizing the clarity of expression rather than the principles involved.

There is one question of overall policy, however, on which I would like to comment here. This relates to the provisions of section 170d which applies to Commission contracts. It seems to me desirable that the provisions of the bill cover all Government facilities rather than a segment limited by contractual relations.

If there should be questions in the minds of the committee as to whether or not such inclusion is too sweeping, I would like to point out that under the present legislation Government facilities must either be licensed under section 103 or 104 or authorized under section 91b. Regardless of the method used, it is desirable in my opinion that the Commission retain some responsibility with respect to these facilities and that normal safeguards procedure apply. It appears to me, therefore, that the Commission can properly be given indemnity authority with respect to all facilities authorized under these sections. If desirable, this indemnity authority could be coupled with a power in the Commission to redelegate this authority to other Government agencies where that was appropriate.

May I again express my warm appreciation of the way that your committee has attacked the problem and conducted its hearings. If appropriate action is forthcoming from this session of the Congress, I believe that your committee will have done a great public service.

Sincerely yours,

FRANCIS K. MCCUNE,
Vice President and General Manager.

COMMENTS ON S. 3929

This memorandum is addressed to the provisions of S. 3929 as introduced by Senator Anderson on May 25, 1956.

SECTION 53E (8)

The proposed amendment of section 53e (8) could be read as requiring licensees to hold the Government harmless against liability in an amount greater than

the financial protection to be provided in accordance with section 170a and b. We assume that this was not intended.

Two ways of dealing with this are the following:

(a) Amend section 53e (8) to provide that the Government shall have no liability merely by reason of its ownership of special nuclear material.

(b) Amend section 53e (8) to provide that the licensee will hold the Government harmless against liability resulting from the use or possession of special nuclear material by the licensee but only to the extent of the financial protection required under section 170a and b.

SECTION 170A AND B

Section 170a has a reasonably adequate test for required financial protection. In a literal sense, private protection cannot be reasonably adequate since Government indemnity may be needed in some cases. Section 170b sets forth the specific standards to be employed by the Commission in making its determination as to the amount of required protection. It would seem desirable to make it clear in section 170a that the consideration in section 170b are controlling and that reasonably adequate is not an additional test.

SECTION 170C

1. We assume that the intent of the August 1, 1966 cutoff is that no new indemnity agreements may be made after that date but that agreements made prior to that date will continue to be effective. This could be made clear by changing the words "until August 1, 1966," to words like "with respect to facilities licensed prior to August 1, 1966." In view of the provisions of section 185 of the 1954 act, we assume that a construction permit would, for this purpose, be deemed a license.

2. Section 170c enumerates the people who will receive the benefit of the Government indemnity. There is a danger that any enumeration may not be complete. Three possible classes of people who may not be within the enumeration have occurred to us. These are (i) the user or lessee of part of the space in a materials testing reactor, (ii) the supplier of equipment, not for the facility, but to be used in conjunction with the facility, and (iii) the person who sets in motion external forces which affect the facility (e. g., a plane crashing into the reactor enclosure). Moreover, the term "operator" is not appropriate because of the special meaning of that term in section 11m of the act.

It would seem desirable to add to the enumeration general words such as "any other person who may be subject to such liability." This would make clear the congressional intent to make the Government indemnity available to protect the public no matter who was legally responsible for the nuclear incident.

3. Similarly, it would appear desirable to add general language to the enumeration of types of liability so that it would apply to "any liability [arising out of the radioactive, toxic properties, etc.] to members of the public including liability for bodily injury or death or for loss of or damage to property or for loss of use of property." This again would make explicit the congressional intent to provide Government indemnity to pay any legally recoverable damages resulting from a nuclear incident.

4. Section 170c provides that the contract of indemnification will cover liability "because of activities of the indemnitee during the period of the license." The liability of some indemnitees could arise by reason of acts or omissions in the course of design, manufacture, or construction prior to the period of the license. Substitution of language like "because of acts or omissions of the indemnitee prior to the expiration of the license" would seem desirable. The indemnity would, of course, apply even though the claim was made after the period of the license so long as the act or omission out of which the claim arose occurred prior to expiration of the license.

SECTION 170D

1. The language "public liability claims" in section 170d differs from the comparable language in section 170c. The suggestion made in paragraph 3 above with respect to section 170c is applicable to section 170d.

2. The indemnity would apply to liability "because of activities of the indemnitee during the period of the contract." It is possible that liability could arise because of activities of the indemnitee prior to the period of the contract

(as in the case of standard equipment manufactured before the date of the contract and subsequently sold to the contractor) or subsequent to the period of the construction contract (as in the case of fuel fabricated and supplied some time after the facility was completed). A phrase like "because of acts or omissions prior to or during the life of the facility" would meet these objections.

3. The "but not in excess of $500,000,000" clause ought to be on the same basis as section 170c, that is "for each incident."

4. The enumeration "owner, operator, etc." which appears in section 170c is not reproduced in section 170d. By the terms of section 170d, the indemnity would run to the contractor and to subcontractors and suppliers. This could be construed to mean subcontractors and suppliers of the indemnified prime contractor for construction or operation. In that case, the indemnity would not run, for example, (i) to the architect-engineer who designed the facility as Government prime contractor or (ii) to the person who, as Government prime contractor, supplied equipment to be incorporated in the facility or to be used in conjunction with it. It would seem that the language of section 170c with the changes suggested in paragraph 2 above with respect to section 170c would be desirable.

The technique employed in section 170c of having one indemnity agreement which would be for the benefit of all persons who might incur liability in connection with the facility could still be employed under section 170d.

5. The language "Such agreements shall be for activities performed within the terms of the contract" might be read too narrowly. Presumably, the quoted words are intended to define the scope of the indemnity. However, the language in the preceding sentence "arising out of * * * materials used in or resulting from the construction or operation of the facility * * *" would seem adequate for this purpose. Moreover, there is even a risk of an extreme reading of the phrase "within the terms of contract" which would deny the indemnity where there had been some breach of contract on the ground that an activity in breach of a contract was not within its terms. Finally, an affirmative word like "activities" is not desirable where liability may arise out of acts or omissions. For all these reasons we suggest that the language in question be deleted.

6. A decision to make section 170d applicable to contracts of other Government agencies would require substitution of the phrase "financed in whole or in part with Government funds" for the phrase "financed in whole or in part by the Commission."

SECTION 170e

1. Where the damage caused by a nuclear incident exceeds the total amount available to pay claims, it is important that the district court be in the picture early so that it will be able to assure an equitable apportionment. Hence section 170e ought to provide for invocation of the district court's jurisdiction upon a showing by the Commission or any indemnitee that it was probable that the damages exceeded "this aggregate sum."

2. The words, "upon appropriate proof of damage", suggest that the district court may have some jurisdiction to determine claims. Wouldn't it be better to delete this phrase so as to eliminate all doubt that the determination of claims (as distinct from provision for the payment of claims) was the function of the courts, State and Federal, which would otherwise have jurisdiction?

3. In order to implement its power to make an equitable apportionment of the total amount available to pay claims, shouldn't the district court have the power to stay execution of judgments of other courts, to stay making of payments pursuant to settlements and to make other appropriate orders?

SECTION 170h

Section 170h applies to cases "Where it appears that there may be damages * * * for which the United States shall be required to make an indemnification." The section might be modified to define the indemnitee's obligation in those cases as that of providing reasonable assistance to the Attorney General in the defense of claims.

Respectfully submitted.

EVERETT L. HOLLIS.
WILLIAM F. KENNEDY.

78731—56——26

NEW YORK, N. Y., *June 11, 1956.*

Hon. CLINTON P. ANDERSON,
Joint Committee on Atomic Energy,
Congress of the United States:

Senate bill S. 3929, generally, involves the question of indemnity on which subject my associates in the casualty business should speak. It would be presumptuous on my part to attempt to take a position on this bill other than to advise you that, generally, I believe it is a good start to the solution of a very difficult problem. In connection with H. R. 11242 there are some features of this bill that are appealing, but I think it is a grave mistake to introduce a reinsurance program as outlined therein and, as we have previously expressed, would be very much opposed to enactment of this type of legislation.

KENNETH E. BLACK,
President, the Home Insurance Co.

AMERICAN GAS & ELECTRIC CO.,
New York, N. Y., June 11, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
United States Senate, Washington, D. C.

DEAR SENATOR ANDERSON: This is in response to your letter of May 31 requesting comments on S. 3929 and H. R. 11242, currently under consideration by your committee.

Both S. 3929 and H. R. 11242 are aimed at a solution to the important problem of providing financial protection for the public and for those organizations associated with the construction and operation of nuclear reactors in the highly improbable but nevertheless serious contingency of a nuclear catastrophe. I have previously testified, along with many others, before your committee on the need for prompt legislation to meet this problem.

I understand S. 3929 to incorporate the proposal contained in your letter of April 25. As I indicated in my testimony before the committee on May 17, I strongly endorse that proposal—and, therefore, S. 3929—as a way of meeting the insurance dilemma. Our counsel have reviewed the specific language of S. 3929 and have made some comments, relating primarily to matters of clarification, which have already been communicated informally to members of your committee's staff. For your convenience, I am attaching a memorandum of counsel summarizing the most important of these comments.

H. R. 11242 does not appear to contemplate that insurance or indemnification would be required in all cases. Moreover, it provides that the protection afforded by that bill would not be available under certain described circumstances. It seems to me that these features would wholly defeat what should be the primary objective of the legislation—i. e., to provide financial protection for both the public and those engaged in the construction and operation of reactors. For this reason, it is my opinion that H. R. 11242 would not provide an adequate solution to the problem. We have not, therefore, tried to make any further analysis of its provisions.

For the reasons indicated in my testimony before the committee on March 6 and May 17, I think it is of great importance, in advancing our atomic power program, that the insurance problem be solved as quickly as possible. I certainly hope, therefore, that it will be possible for the committee to report out legislation, such as S. 3929, in time for it to be acted upon by the Congress this session.

Very truly yours,

PHILIP SPORN.

MEMORANDUM OF COUNSEL COMMENTING ON S. 3929

(To accompany letter dated June 11, 1956, from Mr. Philip Sporn to Senator Clinton P. Anderson, Chairman, Joint Committee on Atomic Energy)

SECTION 53E (8)

This section as presently drafted could be construed to require licensees to hold the Government harmless on account of claims against the Government exceeding the $500 million Government indemnity. We believe it is intended that licensees

hold the Government harmless against such claims only up to the limit of the amount of financial protection required under section 170a. One means of clarifying section 53e (8) would be to revise the opening phrase of the section to read as follows: "Except to the extent that the United States shall have granted indemnity to or limited the liability of licensees as provided in section 170 of this act, the licensee, etc."

SECTION 170A

We believe that it is the intention of this section to permit licensees to meet the requirement of private financial protection, among other means, by proof of the licensee's financial ability to respond to public liability claims up to the amount determined by the Commission, and that it is not the intention to require the establishment of extraordinary reserves or the posting of other forms of security which the term "self-insurance" might connote. We suggest, therefore, adding after the term "self-insurance" (p. 3, line 2) the words "proof of financial responsibility."

SECTION 170C

1. As we understand this section, the Government indemnity would apply to all facilities licensed prior to August 1, 1966, and would be effective for the full period of the license. This intent would be more clearly expressed by changing the words "until August 1, 1966" (p. 3, line 12) to read "with respect to facilities licensed prior to August 1, 1956." A construction permit issued prior to August 1, 1966, would constitute a license for purposes of this section, since section 185 of the existing 1954 act provides that "for all other purposes a construction permit is deemed to be a 'license.' "

2. The second full sentence of section 170c refers to a contract of indemnification with the licensee covering liability "because of actions of the indemnities during the period of the license" (p. 4, lines 9–10). This language might be read to exclude the activities of certain indemnities, e. g., the designer of a facility, which took place prior to the issuance of a license. We suggest that the quoted phrase be changed to read "because of incidents occurring during the period of the license."

3. Section 170c provides a Government indemnification for liability to members of the public for bodily injury or death or for "property damage, including loss of use" (p. 3, line 24). We assume it was intended that this indemnity should be broad enough to cover the situation where property becomes temporarily unuseable because of radioactive contamination of the area in which the property is located, or, for example, of the water supply on which users of the property depend. There is some danger that the words used in the bill would, however, be construed to cover only situations in which the loss of use of property was accompanied by physical damage to the property itself. This danger would be avoided if the quoted language were changed to read "property damage, or loss of use of property."

SECTION 170E

We believe that this section ought clearly to authorize the Federal court promptly to take jurisdiction over the payment of claims upon a showing that the total damage might exceed the amount of private financial protection plus the Government indemnity. The Federal court ought also, in order to assure an equitable apportionment of funds available, have authority to stay the payment of all claims pending apportionment. We do not believe it is necessary, and we do not understand it to be the intention of the bill, that all claims be adjudicated in a single Federal court. We would see no reason why other courts might not determine claims and establish the amount of damages, provided that the Federal court controls the actual payment of adjudicated claims.

PENNSYLVANIA POWER & LIGHT CO.,
Allentown, Pa., June 1, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
United States Senate, Washington, D. C.

DEAR SENATOR ANDERSON: In accordance with our brief discussion at the insurance hearings held by your committee on Friday, May 18, I am enclosing four copies of a memorandum of law on the constitutional aspects of amending the

Atomic Energy Act of 1954, to provide for appropriate limitation of liability of reactor owners and operators, and other interested parties. I hope that this memorandum will be some use of your committee in its consideration of the important and interrelated matters of insurance, indemnity, and limitation of liability.

Sincerely yours,

CHAS. E. OAKES, *President.*

MEMORANDUM FOR PENNSYLVANIA POWER & LIGHT CO.

In connection with the problem of liabilities which may be incurred by private licensees of the Atomic Energy Commission, the question is presented whether, under the Federal Constitution, the Congress, in order to advance the several purposes of the Atomic Energy Act of 1954, may adopt legislation limiting the liability of those responsible for the construction, equipment and operation of atomic facilities for possible harm to others that may flow from the use of such facilities and the hazardous properties of the nuclear materials employed therein.

It is assumed that the legislative program enacted, in connection with the abolition or alteration of existing remedies, will appropriately provide recognition of essential private rights on an equitable basis and will further provide for implementing procedures consistent with procedural due process.

The problem considered is a novel one and the legislative means suggested impinges upon an area of private rights and responsibilities which is ordinarily a matter of State concern.

It is believed, however, (*a*) that adequate affirmative powers exist to support the selection by the Congress of a limitation of liability as a part of the legislative program to the end in view, and (*b*) that legislation which conforms to the basic assumption stated above would not be found to contravene specific constitutional restrictions on the congressional use of those affirmative powers.

A more detailed discussion of the problem follows.

THE QUESTION CONSIDERED

> May the Congress, in order to advance the several purposes of the Atomic Energy Act of 1954, constitutionally adopt legislation limiting the liability of those responsible for the construction, equipment, and operation of atomic facilities for possible harm to others that may flow from the use of such facilities and the hazardous properties of the nuclear materials employed therein?

It must be stated at the outset that although there are certain analogies which appear to be relevant to the problems under discussion, there has not been found any strictly comparable precedent in our jurisprudence. Hence, the conclusions later expressed are necessarily bottomed on and supported by what is believed to be the reasonable and justifiable application of concepts heretofore adopted in legislation and, to the extent attacked on constitutional grounds, upheld by the courts.

It would also seem appropriate as a prelude to the later discussion to consider the background in which the problems dealt with arise.

The field of atomic energy and the ownership, possession, and use of presently known fissionable materials has been predominantly in the hands of the Federal Government throughout the transition of the use of the atom through fission from a theoretical possibility to a practical reality. During World War II the Federal Government expended billions of dollars in an active and successful program to develop atomic weapons for national defense. This program was necessarily shrouded with the utmost secrecy, and even the existence of this new field was unknown to the public until the announcement of the successful explosion of an atomic bomb. Shortly thereafter the Congress enacted the Atomic Energy Act of 1946 (60 Stat. 755; 42 U. S. C. A., sec. 1801 ff.), confirming the wartime action and establishing the initial broad legislative controls in the atomic field. When this act was passed, secrecy was a primary requisite to preserve the defense advantage then achieved. Private ownership, production, and use of fissionable materials was made unlawful except for limited use by private interests in research and development facilities, or in amounts found by the Atomic Energy Commission (AEC) to be inconsequential.

The Atomic Energy Act of 1954 (68 Stat. 919; 42 U. S. C. A., sec. 2011 ff.), among its several purposes, undertook as a national public policy, to permit and

encourage private participation in the development and utilization of atomic energy. No attempt will be made here to discuss in any detail its present terms and provisions for which reference is made to the act itself.

It is, however, in connection with this act that the problems herein discussed are posed. The act, among other things, contemplates and makes provision for the granting by AEC of licenses for the manufacture and operation of atomic facilities by private industry for limited purposes (secs. 103, 104). In these privately owned facilities the licensees will use nuclear matter which will nonetheless remain Government property.

A major concern on the part of many present and prospective applicants for licenses under the act is the lack of available protection against possible liabilities to third parties arising from the use and operation of atomic facilities. While the private insurance industry has indicated a readiness to make available substantial coverage against liabilities of the type in question, coverage available at this time would not appear to be sufficient to solve the problem. As a result, no general assurance of adequate compensation to the general public for possible harm can at present be held out, and, on the other hand, unmeasurable financial risks are imposed on the licensee. In this connection, it is a reasonable assumption that, in the event of an atomic disaster, escaping nuclear materials and harm therefrom would not be limited to the State of origin. There is compelling need to find an appropriate way to dispel this concern which will be coupled with a feasible means of providing for the unpredictable losses that might be incurred by third parties in the event of such a catastrophe. This need gives rise to the subject question.

One suggested solution of this problem has been tentatively outlined by the Chairman of the Congressional Joint Committee on Atomic Energy, Senator Clinton P. Anderson. In Senator Anderson's open letter of April 25, 1956, he summarized this proposal as follows:

"1. A governmental indemnity over and above a reasonable amount of public (third party) liability insurance provided by the private insurance industry at reasonable rates. A ceiling of $500 million would be placed on the governmental indemnity for any one disaster, with any damages over this sum to be handled by special legislation.

"2. The liability of reactor operators and equipment manufacturers would be limited to their private insurance coverage, together with the sums made available by the Government for the third party claims under the indemnity arrangement.

"3. The Government would make a minimum charge per year per reactor for its indemnity coverage with the proceeds to be devoted to the AEC's research and development program on atomic safety."

While problems relating to an indemnity or other compensation arrangement by the Government are not directly within the scope of the question dealt with by his memorandum, it is believed that such an arrangement as part of a statutory plan for limitation of liability raises no substantive constitutional problem of its own. An indemnity arrangement in present context would seem, at the least, a proper adjunct of the power of Congress over Government property, and particularly so where the Government accepts responsibility for seeing that its property in its licensees' hands is used in a safe manner. It is the concept of a limitation of liability in conjunction with an indemnity arrangement which gives rise to the question under consideration.

Without proposing or considering the merits of any particular legislation or legislative program involving as a part thereof a limitation of liability, it would seem necessary, in considering the constitutional problems involved, to make the basic assumption that the legislative program enacted in connection with the abolition or alteration of existing remedies, will appropriately provide recognition of essential private rights on an equitable basis and will further provide for implementating procedures consistent with procedural due process.

It is against this background that the question posed is considered. The answer to that question requires considering first whether such a limitation of liability may be constitutionally justified by a power or powers delegated to the Congress. Thereafter it must be considered whether or not such a measure may contravene any specific constitutional restriction on the use of the powers affirmatively granted.

To be effective any such legislation necessarily would produce a change in the legal consequences which would otherwise ensue under existing State and Federal laws in the tort field. The change would flow from the enactment of Federal

legislation supplanting, to the extent required, other laws in the field. Such legislation would reduce to the extent specified liabilities otherwise imposed.

It is this supersession of State law and novel change of common law, or in some cases, statutory remedies for tortious injury which must be justified as a proper exercise of one or more of the powers delegated to the Congress. As will be shown below, the fact that common law rights and remedies may be curtailed by a statutory limitation of liability does not in itself appear to be a problem of constitutional dimension. "The Constitution does not forbid the creation of new rights, or the abolition of old ones recognized by the common law, to attain a permissible legislative objective" (*Silver* v. *Silver*, 280 U. S. 117, 122 (1929)).

The legislative objectives of, and the general factual justification for, the Atomic Energy Act of 1954 are set forth in the first three sections of that statute and in the report of the Joint Committee on Atomic Energy with respect thereto (S. Rept. No. 1699, 83d Cong., 2d sess.). The constitutional powers invoked thereby include, among others, the defense power, the commerce power, and the power to regulate the use of property of the United States. The Congress may, of course, resort to any applicable delegated power, including the bankruptcy power, in implementing a legislative program to limit liability.

It is not unprecedented to find legislation based on not one but a combination of these plenary powers and for the Congress to invoke the use of the defense power in time of peace. Such use has been upheld by the Supreme Court (*Ashwander* v. *Tennessee Valley Authority*, 297 U. S. 288 (1936)).

It is well established that, in invoking these powers, the Congress may adopt measures and authorize activities which override or contravene State law, provided that the means selected by the Congress is appropriate to accomplish the objects for which the plenary powers were delegated. This result is not only implicit in the grant of plenary power but is made explicit by the last clause of article I, section 8 of the Constitution (the "necessary and proper" clause) (*McCulloch* v. *Maryland*, 4 Wheat. 316 (1819)). If the means selected by the Congress is reasonably related to a permitted end, the 10th amendment to the Constitution, reserving to the States or the people powers not delegated to the United States, is not a bar to the action of the Congress. (*United States* v. *Darby*, 312 U. S. 100, 123–124 (1941)).

The commerce power, for example, is generally described as the power to enact all appropriate legislation for the protection and advancement of interstate commerce and to adopt measures to promote its growth and insure its safety (*National Labor Relations Board* v. *Jones & Laughlin*, 301 U. S. 1, 36–37 (1937)). This power reaches wholly local activities which have a substantial economic effect on interstate commerce (*Wickard* v. *Filburn*, 317 U. S. 111 (1942)). In the exercise of this power, the Congress has constitutionally effected rather drastic alteration, or even abrogation, of private rights and remedies theretofore secured by State law.

Thus, the Congress has invoked the commerce power in the field of labor relations, and there it has laid down substantive rules of law and in marked degree superseded State law providing remedies to private persons for the protection of private rights (*Garner* v. *Teamsters Union*, 346 U. S. 485 (1953)); compare *United Workers* v. *Laburnum*, 347 U. S. 656 (1954)). The commerce power has also been help to authorize the abrogation of stockholders' rights in public utility holding companies (*American Power & Light* v. *SEC.*, 329 U. S. 90 (1946)).

Other delegated powers, for example, the fiscal power, have been held constitutionally exercised to effect substantial changes in private rights, e. g., the abrogation of the gold clause (*Norman* v. *B. & O. R. R. Co.*, 294 U. S. 240 (1935)).

In *Ruddy* v. *Rossi* (248 U. S. 104 (1918)), it was held a proper exercise of congressional power in disposing of public lands as homesteads to exempt them from liability for certain debts of the homesteader. This exemption of property from liability otherwise existing under State law in order to bring about the development of the lands disposed of, although less far-reaching than the kind of limitation here considered, seems a fairly analogous one.

There are, of course, areas of conduct, control of which the Supreme Court has held, or likely may hold is left by the Constitution to the responsibility of the States. The regulation of the areas of conduct with which the law of torts ordinarily deals is indisputably an important matter of State concern (*Erie* v. *Tompkins*, 304 U. S. 64 (1938)).

A remaining question, therefore, is whether legislation which would limit private liability is reasonably related to the congressional objective it is to serve. A principal objective of the legislative program which would effect the limitation of liability here discussed is to encourage private enterprise to take part in the development and utilization of atomic energy. The public purposes in doing so are set forth in the provisions of the Atomic Energy Act of 1954 referred to above. Limitation of liability is, of course, a novel legislative means in the field under consideration, but it is not without analogy in others.

For example, successive Federal legislation has authorized shipowners to limit their liability, not only to persons in contractual relationships with them but also to strangers. As expressed in several decisions of the Supreme Court, the reason for the rule is pertinent to the problem here. The Supreme Court has said, in effect, that a proper justification for the limitation of the liability of shipowners is to encourage private capital to enter a business affected with the national interest. (See, e. g., *American Car & Foundry Co.* v. *Brassert*, 289 U. S. 261, 263–4 (1933).)

Precedents upholding, against attack on both Federal and State constitutional grounds, legislative power to change tort liability are numerous, but of course, are principally to be found in the decisions of State courts. Generally speaking the State laws have dealt with rights and liabilities between persons in consensual relationship, i. e., master and servant, husband and wife, automobile driver and passenger, carriers and passengers and innkeepers and guests. States, however, have also completely abolished common law causes of action for alienation of affections and breach of promise. Without setting a dollar limit on recovery, State legislatures have also limited causes of action for defamation so that only special and not general damages are recoverable.

Probably the most important area in which the States have dealt drastically with common law liabilities and remedies has been in the field of workmen's compensation and employers' liability. The Federal Government has also dealt in the same manner with workmen's compensation and employers' liability in the maritime and other fields.

Such laws generally limit damages but in return substitute therefor compensation for injuries not compensable to the injured employee under the common law of torts (*New York Central R. Co.* v. *White*, 248 U. S. 188 (1917)). They also provide surer and more efficient remedies than an action at law (*Jensen* v. *Southern Pacific Co.*, 215 N. Y. 514, 109 N. E. 600 (1915)). These statutes, however, have frequently abolished completely rights to recover for certain injuries, e. g., the husband's right to recover for loss of his wife's services. In New York the court of appeals recently upheld as against due process objections, based both on the Federal and State constitutions, the power of the legislature to abolish completely an employee's right to recover for partial disability from silicosis (*Cifolo* v. *General Electric Company*, 305 N. Y. 209, 112 N. E. 2d 197, cert. den., 346 U. S. 874 (1953)).

The cases holding constitutional the various workmen's compensation laws suggest the general outlines of a due process test, which, under the basic assumption stated above, would be met by the proposed Federal legislation and its administrative or judicial application. These precedents also indicate that far-reaching legislative measures altering common law rights and remedies in the tort field are not ipso facto unconstitutional.

Moreover, there are a substantial number of factors tending to indicate that a congressional judgment of what is necessary and appropriate legislation in the atomic energy field is entitled to as strong a presumption of constitutional propriety as the Supreme Court has ever given to that judgment. Such factors include the history to date of the development and the utilization of atomic energy, the recognized need in the national interest to encourage the employment by private industry of its resources in further development and utilization, the present status of almost the entire field as a monopoly of the Federal Government, the acknowledged responsibility of the Government for safety regulation and standards and the present inability to predict not only the risks but the nature and scope of the future development of the field in the national and international as well as in the purely local areas of our society.

To serve general public purposes the Congress, therefore, is undertaking to permit and encourage private enterprise to take part in the development and utilization of atomic energy. Whether a legislative program which includes a limitation of liability of the nature discussed above is the best or more appropriate means to such an end, is not within the province of this discussion. It is

believed, however, that such a legislative means cannot be said to lack a reasonable relationship to the end in view. Whether there are, or are not, other appropriate, or better adapted, means to the end, it follows that the decision of the Congress as to the degree of necessity for the adoption of the particular means should be final, and that the particular means meets the test of being appropriate and plainly adapted to a permitted end (*Norman* v. *B & O. R. Co.*, 294 U. S. 240, 311 (1935); *Everard Breweries* v. *Day*, 265 U. S. 545, 558–9 (1924)).

While the problem under consideration is a novel one, it is believed, in view of its context and background that: (*a*) adequate affirmative powers, as heretofore stated, exist to support the selection by the Congress of a limitation of liability, as a part of the legislative means to the end in view, and (*b*) legislation enacted in conformity with the basic assumption made above would not be found to contravene specific constitutional restrictions on the use of those affirmative powers.

SIMPSON, THACHER & BARTLETT.

JUNE 1, 1956.

PENNSYLVANIA POWER & LIGHT CO.,
Allentown, Pa., June 11, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
The Capitol, Washington, D. C.

DEAR SENATOR ANDERSON: This is in reply to your letters of May 31, 1956, to Mr. Geo. M. Keenan and myself, enclosing copies of S. 3929 and H. R. 11242 and requesting our comments on these two bills.

In keeping with our prior testimony at the hearings on May 18 we believe that S. 3929 provides a satisfactory means of resolving the insurance problem at this time. It would represent very real progress indeed, if suitable legislation could be enacted to properly dispose of this insurance question during this session of Congress.

We appreciate that there are limitations of time which must be reckoned with if any such schedule is to be met. With this in mind, and not intending in any way to detract from taking prompt action to enact S. 3929, we are submitting the following comments.

H. R. 11242

Section 169–1. a. (6).—We are very strongly against the provisions of section 161–1 a. which makes the Government indemnity inapplicable in the case of "bad faith, willful misconduct or gross negligence" on the part of the indemnitee. For the situation of an atomic accident the nonapplicability of the Government indemnity in the event of "gross negligence," for example, would simply mean imposition of the burden of loss on the injured party since the basic assumption upon which the proposed legislation rests is that all available assets of the operator would not necessarily be sufficient to meet damages caused by an atomic accident. We think this circumstance far outweighs any benefit which may be thought to be derivable from section 169–1 a. (6) in that it would cause reactor operators and their agents to be more careful than otherwise. The pressures and controls which bear upon the matter of safety are now already so great as to assure that there will be the safest possible job of constructing and operating power reactors.

Section 169–1 b.—As we understand the effect of these provisions, it is that the indemnitee buys a certain amount of indemnity coverage, the amount so purchased presumably being with the discretion of the purchaser and not subject to review or finding of adequacy by anyone. It does not appear to be sound, in a situation where Government indemnity is to be provided because conventional insurance protection is not sufficiently extensive, to return the reactor owner and operator and other interested parties to the position of self-insurers for all risks above an uncontrolled ceiling of indemnity coverage.

Limitation of Liability.—We consider it to be an important weakness that no provision is made for limitation of liability.

Administration of Claims.—There do not appear to be any standards set or provisions made to insure equitable and uniform handling of the claims which could arise from an atomic accident.

S. 3929

Section 2.—Shouldn't the amendment to section 53 e. (8) be written so as to limit liability to the Government to the amount of the financial protection required under secion 170? This would seem to be the intended construction. Othrewise, there is the contradictory situation that the Government obligation to indemnify the operator and others under section 170 exists side by side with the obligation of the operator (licensee of special nuclear material) to indemnify the Government.

Relationship of subsections (a) and (b) of section 170.—Is there any necessary or logical relationship between an amount of financial protection reasonably adequate to cover claims due to an atomic accident and the amount of cost of conventional insurance? It would seem that the amount of protection which is objectively desirable does not depend on the amount which is available as a practical matter. In this respect, aren't there advantages in the approach in H. R. 11242, section 169–1 a. (3), at page 2, lines 19–25?

Section 170 b.—Should there be a distinction between private and public ownership? Since Government undertakes to compete in the power field, should there be any distinction between private companies and public bodies?

Section 170 (c).—It would probably be more specific and affirmative if the language were changed to provide that the Commission "shall indemnify by appropriate agreement" rather than "shall agree to indemnify." Likewise, it might well be clearer if the indemnity, instead of being "in the event of" claims, were "against" claims.

Thre is no indication of the timing of execution by the Commission of an indemnity agreement. Should this be upon request by the licensee?

May uncertainty be caused by tying the indemnity to the licensee in view of the many things which will be done by the holder of a construction permit?

The last sentence of the subsection seems to be unduly narrow in that it only covers liability "because of activities of the indemnitee." This is subject to an erroneous interpretation that component parts suppliers and other interested parties are excluded.

Since there may be changes and amendments in the original license should the provision of indemnity "for the period of the license" be made to read "for the period for which the facility is licensed"?

Administration of Claims (section 170 (e) and (h)).—The question of uniform and fair administration of claims arises immediately upon the occurrence of any accident as to which the claims may be made in excess of conventional insurance coverage. In view of this, shouldn't centralized administration be made available at such point of time, and not after damages exceed conventional insurance plus indemnity plus other sums made available by Government as now provided by subsection (e)? Shouldn't it be the case that if the Government indemnity has to be invoked then all claims should be handled on the same basis?

We have some concern about the last sentence of subsection (h). Notwithstanding a laudable purpose of granting AEC freedom to settle claims on a fair basis, without regard to legalisms, does this provision perhaps also raise by implication unnecessary questions about possible abrogation of State law; If centralized adminitration were provided for (such as is specified in subsection (e) which vouches in the Federal district court having bankruptcy jurisdiction over the licensee) wouldn't there be a proper bypassing of the whole problem of individuals litigating in the State courts claims which would only be payable by the Federal Government?

Limitation of liability (section 170 (e)).—The limitation of liability could be more precisely stated by making page 5, line 17, read as follows: "obtained, together with the sums *made available as provided by* [set forth in] subsections."

This change would conform to the reference later on in the same sentence to "any other sums which may be made available by the Congress." Likewise, the words "made available" could be appropriately added after "aggregate sum" in line 21, in the next sentence.

In conclusion, I sincerely hope that these detailed comments will not prove burdensome. It was thought that at this juncture specific comments, even if somewhat lengthy, might have some useful purpose.

Again, let me express my thanks for this opportunity, as well as the other opportunities afforded by the Joint Committee, to submit our comments on the insurance question and the Gore bill. With respect to the latter, I take this occasion to state that both Pennsylvania Power & Light Co. and the utility industry as a whole fully appreciate that if we do not do a good job in the field

of reactor development, then others, specifically the Government, will do that job. This prospect of Government intervention certainly gives our industry an additional and forceful incentive to go ahead vigorously and effectively. I most strongly urge that we be given an opportunity to prove that we can do the job.

Sincerely yours,

CHAS. E. OAKES, *President.*

YANKEE ATOMIC ELECTRIC CO.,
Boston, Mass., June 7, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Senate Post Office, Washington 25, D. C.

DEAR SENATOR ANDERSON: Your letters of May 31 to Mr. Allen and myself enclosed copies of S. 3929 and H. R. 11242, dealing with the indemnity and insurance problem, and requested our comments as soon as possible.

It seems to us that either of these bills will provide a satisfactory solution of the insurance problem so far as the Yankee project is concerned, and will remove what has appeared to be the only major difficulty which cannot be solved without additional legislation.

I say this recognizing that any legislation in this new field will involve problems which cannot now be foreseen. We realize that the indemnity program will receive the continuing attention of the Joint Committee and of the Commission, and are confident that any clarifying amendments which experience may indicate are necessary will be made from time to time as the program is carried out.

Yours very truly,

WILLIAM WEBSTER, *President.*

NEW ENGLAND POWER SERVICE CO.,
Boston, Mass., June 8, 1956.

JAMES T. RAMEY,
Executive Director, Joint Committee on Atomic Energy,
Senate Post Office, Washington, D. C.

DEAR MR. RAMEY: This letter summarizes the comments on the Anderson bill, S. 3929, which we discussed on the telephone yesterday. Since my interest in the bill is on behalf of Yankee Atomic Electric Co., my comments are primarily from the point of view of a prospective licensee.

My principal comments of substance relate to the following:

1. The difficulty which the AEC will have in determining a "reasonably adequate" amount of private insurance under section 170.a, even with the aid of the standards set forth in section 170.b.

2. The ambiguity created by the time limit of August 1, 1966, which appears in section 170.c. I understand that this is intended to limit only the time within which the Commission may enter into an indemnity agreement, and that once made the agreement will cover any reactor incident occurring within the term of the license.

3. The difficulties which a court would encounter in administering the limitation of liability provisions of section 170.e without more specific provisions in the basic act.

4. The lack of any specific provisions to finance the governmental indemnity, such as are provided by the Cole bill.

Section by section my comments are as follows:

Section 2i

Line 2: "In order to encourage the development and operation of production and utilization facilities"? (You intend to encourage both types of facilities.)

Lines 3 and 4: "the United States may assume liability for a portion of any damages which may be suffered by the public"? (We all hope there will be none.)

Line 4: "suffered by the public as a result of the design, construction, or operation of such facilities"?

Line 6: "may limit the liability of those persons who may be held responsible for such losses"?

Section 58e (8)

Should this section be eliminated? As it stands in the present act it says, in effect, that the Government shall be protected by the licensee against any *Macpherson* v. *Buick* type of liability that could arise from furnishing dangerous or defective materials. Section 170.a will now expressly state that nuclear materials have "radioactive, toxic, explosive, and other hazardous properties", which tends to increase the exposure. On the other hand, the Government is assuming a much larger obligation to the public by the indemnity agreements authorized by the new act.

Put another way, the Government's theoretical exposure here is at three levels: (1) in the band covered by private insurance, (2) in the band covered by the indemnity agreement, and (3) in the band covered by the limitation of liability. If a licensee assumes the obligation of holding the Government harmless, (1) the United States must be named in the private insurance policies as one of the persons insured; (2) there is no problem in the band covered by the Government indemnity; (3) the limitation of liability in section 170.e should include the United States as one of the persons covered. If for any reason the limitation of liability provision is ineffective, the top risk will fall on the licensee, but this appears to be more of a theoretical risk than a practical cause of concern.

Section 170a

I assume that the AEC would not approve a "type" of financial protection which did not cover manufacturers, suppliers, etc.—and the United States, if my analysis above is correct.

"Reasonably adequate." If the amount of basic private insurance is measured by the total claims which might arise from the maximum credible accident, there is obviously no amount that is "reasonably adequate," and the standards of section 170.b are of no relevance to that question. From the point of view of a licensee, the real question is how much private insurance can he afford, section 170.b (2), and this question cannot be answered until more is known about the level of premiums which will be required.

While "public liability claims" is a somewhat general category, I assume that the content of this phrase would be carried over from section 170.c, where it is more expressly stated as "liability to members of the public for bodily injury or death or property damage, including loss of use."

I am not clear what is meant by "private contractual indemnities" as distinguished from "private insurance". Would an indemnity agreement from an equipment manufacturer be taken into account to lessen the amount of private insurance to be obtained by a licensee?

Section 170b

In clause (3), I assume that the "type" of facility includes the notion that a reactor may be for research, experimental, demonstration, or commercial purposes, and the Commisison is entitled to take into consideration the varying degrees of national interest in having a particular facility built, even to the point of requiring less private insurance than might otherwise be found "reasonably adequate" to protect the general public. Could this idea be expanded?

Clause (4) distinguishes between private ownership and public or nonprofit ownership. Is this intended to recognize the possibility that a charitable corporation, for example, might limit its liability to persons injured by asserting the special charitable defense against tort claims? If there were no overriding governmental indemnity, this would leave the injured persons unprotected. With the overriding indemnity involved, it would mean that the Government will be assuming a larger share of the damages.

Section 170c

The time limitation "until August 1, 1966" is ambiguous as now written. Would the intent be clearer as follows: "With respect to each production or utilization facility licensed prior to August 1, 1966, the Commission shall agree to indemnify * * *"?

There would seem to be some advantages in having the indemnity agreement appear as a term of the license—paralleling in a general sense the allocation of special nuclear material in a materials license. If this approach were adopted, the section could be drafted: "The Commission shall include as a

term in each license for a production or utilization facility issued prior to August 1, 1966, an agreement to indemnify * * *."

In line 3, should "and" be substituted for "or"?

"as their interests may appear." In a mortgage, this phrase establishes a priority with respect to insurance proceeds as between the mortgagor and mortgagee. This idea does not seem applicable here, where the intent is not to establish priorities as to which indemnitee will be first protected, but simply to indemnify whichever one of them may be held liable to the injured public. I rather imagine that what was intended was some protection against pyramiding—double payments for the same basic claim. This problem occurs in ordinary public liability insurance policies, and possibly representatives of the insurance companies can be helpful here.

"Not to exceed $500 million in the aggregate." I believe this is intended to establish a total pool of $500 million plus the amount of the basic private insurance. There is some implication from the context, however, that the $500 million refers to the total "liability to members of the public" and that the governmental indemnity applies only to the excess of $500 million over the amount of the basic private insurance.

Is the limit $500 million for each incident? or $500 million for each facility, regardless of the number of incidents involved? If the latter meaning is intended, it would be clearer to delete the phrase "and for each incident."

Line 5 on page 4: "indemnities" should read "indemnitees"?

Section 170c

As noted above, should not the limitation of liability apply to claims against the United States as well as the other persons listed? (See comments on section 53.e (8).)

With reference to the "bankruptcy" proceeding:

(1) When can a petition be filed to limit liability—when claims exceed the total fund, or only when judgments exceed the total fund? Do you add claims against the owner to claims against the equipment supplier? If so, duplicate claims presumably must be eliminated.

(2) How does the Federal court implement its order limiting liability? Will it stay proceedings in State courts? Will it stay execution of any judgments obtained? Will it require any attachments to be released? This assumes a fairly far-reaching power in the Federal court that requires an express grant of power by Congress.

(3) "Appropriate proof of damage." Will cases pending in the State courts or other Federal district courts be brought into the "bankruptcy court" and retried? Will cases which have not reached judgment be removed to the "bankruptcy court" for trial?

(4) Within what time must claims be presented to the court in order to share in the fund? What about cancer cases where the injury is not known for a period of years—should the court be empowered to split the fund to provide for 2 pools, 1 for immediate injuries, the other for later claims? Does the court have inherent power to create its own "statutes of limitation" without express congressional authority?

Section 170h

The last sentence is open to the interpretation that the Commission can disapprove a claim even though liability has been established by the judgment of a State court. I believe the intent is merely that the Commission may settle claims without awaiting full trial in a State court. If so, the sentence might read as follows: "The Commission shall have authority to settle or approve the settlement of claims not reduced to judgment without regard to the rules of legal liability in the State of the accident."

I know from our telephone conversation that many of these points are already under study and will be covered in revisions. I trust that this somewhat overlong letter will be of help to you and the staff.

Yours very truly,

D. G. ALLEN.

CONSUMERS PUBLIC POWER DISTRICT,
Columbus, Nebr., June 7, 1956.

Subject: S. 3929 and H. R. 11242, atomic plant insurance.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
The Capitol, Washington, D. C.

DEAR SENATOR ANDERSON: In accordance with your letter of May 31, 1956, and telegram of June 2, 1956, we have analyzed S. 3929 and H. R. 11242 covering the matter of insurance for atomic power installations. The comments of our organization are summarized below:

GENERAL

Both bills recognize the same fundamental problem of providing adequate insurance or indemnity coverage to permit non-Federal organizations to proceed with design, construction, and operation of nuclear powerplants and all of the related activities. The bills do not have identical provisions for the various requirements, so they will be discussed separately.

The following comments, however, apply equally to both bills and will not be repeated in the specific discussions:

1. Neither bill makes provision for protecting the operator of the facility against loss or damage due or resulting from the nuclear features of the facility. To the best of our knowledge, such insurance in connection with workmen's compensation, fire and extended coverage, machinery and breakdown, and loss of use is not now available, nor have we any assurances from the insurance industry that such will be available; however, if available, that the costs will be reasonable and within the ability of the operator to justify in the production of power.

2. The indemnity is apparently intended to extend to all parties having to do with the facility. We are not certain if the language is broad enough to cover such parties as are involved with transportation, fabrication, and processing of fuel elements, use of byproducts (such as gamma radiation from spent fuel elements), handling and storage of radioactive waste.

3. The requirements that the holder of a license must indemnify the Federal Government is retained in the present law. New provisions are added whereby the Federal Government grants indemnity for the claims against the owner, manufacturer, etc., but not against the Federal Government; therefore, it would appear that the provision of section 53e (8) relative to the licensee indemnifying the Commission and the United States requires a special insurance treatment from other third-party claims. With the insurance requirements proposed, it would seem that section 53e (8) in the present law could be repealed.

SPECIFIC COMMENTS ON S. 3929

Page 3, lines 7–8.—We suggest adding after "the cost of insurance," the following: "and its effect on the production of economical electric power." The cost of certain coverages might seem reasonable from an insurance standpoint but be entirely unreasonable and unrealistic from a power producer's standpoint.

Page 3, line 12 (and page 4, line 13).—The date of August 1, 1966, might be erroneously interpreted as the expiration date of the indemnity agreements, whereas the intent apparently is (and should be) that no more indemnity agreements can be entered into after that date, but those entered into prior to August 1, 1966, can be for the period of the license. Perhaps this can be more clearly worded.

Page 3, line 23.—Replace "members of the public" with "persons", which is a defined term under the act.

Page 4, lines 8–10.—Since liability to the public might extend beyond the time the license is in effect, the indemnity protection should extend beyond the period of the license. The language on page 3, lines 17–22, appears to more correctly cover the time during which the indemnity should be effective than that on page 4, lines 8–10.

Page 5, lines 8–24.—This raises the question as to whether the United States Government has the constitutional power to limit the liability for claims. If it does, the sentence beginning on line 20 should have an addition to require the Federal courts to enjoin all proceedings against the indemnitee other than the single Federal court proceedings. Otherwise, the operator will be getting sued in various State courts with only a very doubtful defense.

SPECIFIC COMMENTS ON H. R. 11242

Page 2, lines 7–8.—Indemnity should be broad enough to cover all claims and costs, including court costs, legal fees, etc. Present language seems to limit indemnity "for death, bodily injury, and property damage, including loss of use."

Page 2, lines 19–25.—No provisions are made for determination of reasonableness of cost of private insurance which must be carried, and no protection is afforded the operator against drastic changes in these costs from year to year.

Page 3, lines 7–10.—This limitation is too restrictive, as there is a problem of byproducts, wastes, etc., which carries on beyond "occurrences during the effective term of a permit * * *." See comments on S. 3929, page 4, lines 8–10.

Page 3, lines 11–19.—This provision should be eliminated, as it leaves the public unprotected beyond the assets of the operator, and likewise nullifies the indemnity to others, such as manufacturers, constructors, etc., who had no part in or control over the act which nullified their protection. Consumers District could not risk insolvency because of some act of one of its employees.

Page 3, lines 20–25.—If this provision contemplates a yearly redetermination of the changes to be made, it would leave the operator with no protection against drastic changes. See comment for page 2, lines 19–25.

Page 4, lines 8–25.—With Government reinsurance available, the insurance industry can extend their coverages to a higher limit than might otherwise be possible. The rates would be generally within the control of the insurance industry, as the charge for reinsurance is keyed to the premiums charged for private insurance. This could seriously affect the overall cost of insurance protection to the plant operator and adversely affect the development program. The coverages provided by private insurance should be those possible without Government reinsurance, and the Government's participation limited to the indemnity above the private insurance coverages.

Page 5, e and f.—The question of using an indemnity fund for handling of receipts, expenses, and claims, as contrasted to payment out of appropriations as provided in S. 3929, is largely a matter of procedure. We have no serious objection to either method.

In analyzing the two bills, it appears that S. 3929 generally provides a more satisfactory basis for providing the necessary insurance coverage. The comments set out above would correct, what seems to us, to be major deficiencies.

I appreciate the opportunity to submit the views of our organization on these important matters; and, if any further data or explanatory information is desired, please advise.

Very truly yours,

R. L. SCHACHT, *General Manager.*

SYLVANIA ELECTRIC PRODUCTS, INC.,
ATOMIC ENERGY DIVISION,
Bayside, N. Y., June 11, 1956.

Senator CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Washington, D. C.

DEAR SENATOR ANDERSON: I want to thank you very much for your telegram of June 4, 1956, inviting our comments on the proposed bills covering indemnification and embodied in S. 3929 and H. R. 11242.

From our point of view we feel that there are certain advantages and disadvantages to both of the proposed bills although, on balance, we would favor S. 3929.

We feel that H. R. 11242 is basically deficient in that it contains no indemnification against liability to operators and suppliers of reactors under Government contract. S. 3929 remedies this defect. In my letter to you of May 11, 1956, I pointed out at some length our opinion on the desirability of any bill containing indemnification on liability arising in connection with Government reactors.

On the other hand S. 3929 sets forth a dollar limitation on the Commission's indemnification. While it is entirely likely that the dollar limit provided for would cover all liability in the remote event of a catastrophe, we feel that setting any such dollar limitation gives rise to unnecessary problems. First of all it is the feeling of our attorneys that such a limitation involves serious constitutional questions and might conceivably be invalidated by the courts, thus

exposing the industry to potential unlimited liability above $500 million plus what private coverage is required, and the public to potential loss in commensurate degree. If on the other hand it is the intent of Congress to hold the industry and the public harmless by special legislation in the event that liability exceeds the specified limits there would seem to be little reason for imposing the dollar limitation in the first place.

Both the Senate and House bill limit the coverage of their indemnity to the operators or constructors of production or utilization facilities and suppliers thereof. While it is our feeling that the definition of a production or utilization facility set forth in the licensing regulations would include most of our present and contemplated operations, including a reprocessing operation, there are certain extremely hazardous operations involving equally great potential liability which might not be covered by these definitions or by the coverage of a supplier to a specific production or utilization facility which has an indemnification agreement. One example which immediately comes to mind is an operation designed to process or treat fission products which have at a prior stage already been removed from the irradiated fuel element. Such an operation would not, I believe, come within the definition of either a production or utilization facility and the services or processes pursued in such an operation would normally not be for the constructor or operator of a production or utilization facility. This problem becomes even more acute in the case of work for the Government where many services provided to the Government may not involve production or utilization facilities or direct servicing or supply to such facilities and still may involve substantial hazards of potentially unlimited catastrophe. Accordingly, it is our feeling that further serious consideration should be given to extending the coverage of both the commercial provisions of the Senate and House bill and the Government indemnification provisions of the Senate bill to include indemnification to either holders of facility licenses, prime contractors, suppliers thereto or subcontractors thereof covering in any event any public liability claims arising out of the hazardous properties of the specified materials irrespective of whether or not there is involved any work or supply on, for, or to a production or utilization facility.

Apart from the foregoing fundamental points there are in addition a number of more detailed points on which I would like to comment.

In both the Senate and House bill liability is limited to "that which arises out of or results from radioactive, toxic, explosive, or other hazardous properties of source, special nuclear or byproduct materials used in or resulting from the construction or operation" of a production or utilization facility. It is not clear from this language whether an independent fuel fabricator would be covered against liability arising from an occurrence during the time when the fuel is being fabricated by it as opposed to such as may arise when the fuel element is being manufactured by the constructor of the entire reactor or during the time that the fuel element is actually in the reactor. Since it is apparently intended that the builder of the entire reactor will in any event be covered by the indemnification on liability arising from occurrence during the period of construction, including presumably its own fabrication of fuel elements, it is our feeling that it should be made clear that "construction" of a reactor is intended to include fabrication of the fuel elements and other essential elements of the reactor whether made by the constructor of the entire reactor or by an independent fuel element fabricator.

The quoted language also leaves some question as to whether the supplier of materials other than source, special nuclear or byproduct materials, would be covered by the indemnification. Conceivably the supplier of special components other than the foregoing materials might be held liable for its negligence in fabrication of such a component to which a subsequent reactor excursion might be attributed. At the same time while the excursion might be attributed to the negligence of the component manufacturer the size of the catastrophe would undoubtedly be due to the hazardous properties of the source, special nuclear, or byproduct materials. To make it clear that the manufacturer of the component would be covered in such event I believe that the quoted clause should be revised so that it provides that the liability covered shall include "that which arises out of or results, directly or indirectly, in whole or in part, from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or byproduct materials used in or resulting from the construction or operation" of a production or utilization facility.

Along the same lines I think that it would be well to specifically provide that the indemnification is intended to apply even in the event of intervening negligence by adding a provision in the appropriate places similar to that which is contained in most indemnification agreements with the Commission today; these provide, generally speaking, that the indemnity is intended to apply "whether or not any person or persons employed by or acting for or in behalf of the indemnitee is or are responsible" for the occurrence which gives rise to the liability, some going on to exclude willful misconduct or bad faith of certain employees.

Both the Senate and House bill provide in effect that the Government's indemnification shall cover only liability in excess of a certain amount which the operator or constructor of the facility will be expected to provide for himself. In this respect S. 3929 is preferable to H. R. 11242 in that it recognizes that there may be differences between facilities which should be taken into account in determining the amount that the operator or constructor should be expected to obtain for himself through private insurance or otherwise. However, both the Senate and House bills assume that the facility operator or constructor will seek an indemnification agreement from the Commission for the excess amount. Although it does not seem likely, it is possible that a given operator or constructor may see fit not to seek such an indemnification either because it is not willing to pay the $10,000 fee provided for in the Senate bill or otherwise. Accordingly it would seem desirable to provide in the final version of any bill that, upon tender of any applicable fee, any supplier or subcontractor may seek an appropriate indemnification agreement covering the facility and all suppliers in the event that the constructor or operator does not attempt to negotiate such an agreement.

Both the Senate and House bills seek to tie the indemnification in some way to the period of the permit or license. The House bill seeks to limit the indemnification to liability resulting from "occurrences" during the term of the permit or license. I believe that the Senate bill is far more equitable in limiting the indemnification to liability resulting from "activities" of the indemnitee during the period of the license. It is entirely possible, for instance, that manufacturing or processing activities of a fuel fabricator during the license period might give rise to liability as a result of an occurrence subsequent to the expiration of the facility operator's license. It would seem to be inconsistent with the spirit of this legislation to exclude such liability from its coverage.

Both bills provide that indemnification agreements will be entered into by the Commission. However the House bill merely authorizes the Commission to enter such agreements and permits the Commission to include such terms and conditions, not inconsistent with the bill, as the Commission deems appropriate. We prefer the provisions of subparagraph b on page 3 of the Senate bill which makes mandatory the execution of an agreement in the terms and conditions specified by the bill. This precludes the possibility of inadvertent discrimination among licensees or contractors of the type which has in effect developed under the present system of Government contract indemnification. For the same reasons I believe that the provisions of subparagraph d on page 4 of the Senate bill should be made mandatory in the same manner as the bill now makes mandatory the provisions of subparagraph c on page 3.

Turning now to the Senate bill alone, I would like to make a few specific comments. On the 12th line of page 3 the position of the words "until August 1, 1966," might be construed to imply that the indemnification itself would be limited to liability arising from activities prior to that date. While the last sentence of that subparagraph c tends to negate any such implication I think that for purposes of clarity it would be desirable to substitute for the first few words of that paragraph words similar to those which now appear in subparagraph d on page 4, somewhat as follows:

"c. The Commisison shall, until August 1, 1966, enter agreements to * * *."

On page 4, line 1, and page 5, line 2, of the Senate bill, if a $500 million limitation is to be retained I feel that it should at least be established as the limit applicable to each incident or occurrence and not extended over the entire life of a facility irrespective of the number of incidents or occurrences. If the committee is in agreement I believe that the language on the lines referred to should be clarified to this effect.

While neither the Senate nor the House bill attempts to meet the problem of liability in connection with export of production and utilization facilities or suppliers to the exporters I assume that the committee intends to study this question further and perhaps take action on it at some future date.

I sincerely hope that the foregoing comments will be of some help to your committee in arriving at a final determination on the form of bill which will be recommended on this subject. I want also to take this opportunity to thank you and all the members of the committee once again for the deep and sincere interest that all have taken in this as well as the other problems of the industry and for the great strides that have been made to remove the roadblocks to development of a flourishing private atomic industry in this country.

Respectfully yours,

SYLVANIA ELECTRIC PRODUCTS, INC.,
WALTER E. KINGSTON,
General Manager, Atomic Energy Division.

ATOMIC LAW INSTITUTE,
Washington, D. C., June 11, 1956.

Senator CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States, Washington, D. C.

DEAR SENATOR ANDERSON: At the express invitation of Mr. Ramey, executive director for your committee, I am submitting comments on S. 3929 concerning the excess-insurance-coverage problem for facilities licensed under the Atomic Energy Act of 1954.

Please permit me to bypass the basic policy issues raised by the bill and treat only that phase of it which has been a subject of special study on my part for many months:

IONIZING RADIATION

The unique hazards of peacetime atomic technology center on the phenomenon of ionizing radiation both as an external and internal hazard to humans and as a characteristic or radioactive contamination of property and environment. Therefore the indemnity provisions of S. 3929 must be judged from their adequacy to cope with this risk.

PECULIARITIES OF HAZARD

When we consider the distinctive physiological characteristics of ionizing radiation we find that more than mere legislative authority to "indemnify" against this hazard is required, if we are going to compensate society for possible harm or loss from uncontrolled ionizing radiation released during the developmental period of this technology.

These are the peculiarities of the risk which make an indemnity contract per se an inadequate protection of the public:

(*a*) There are no constant clinical symptoms in the case of moderate overexposure (to ionizing radiation) which can be relied upon to warn of latent radiation injury before the late irreparable changes become manifest.[1]

(*b*) The medical faculty agrees that there is a "natural" incidence of cancer, and yet we are reliably told that a single alpha particle (ionizing radiation) may cause cancer.[2]

(*c*) The harmful effects of ionizing radiation are cumulative, each exposure adding to the previous dose. Even small doses are not entirely reversible.

(*d*) The latent or delayed effects of radiation are illustrated in the *La Porte* v. *U. S. Radium* case (13 F. S. 263 (1935)). We know of no case where cancer attributable to radiation has become manifest sooner than 5 years after exposure.

(*e*) Alpha, beta, gamma, or X-ray radiation bear no distinctive markings in their effects on living tissue to identify the source from which they came.

The foregoing characteristics of ionizing radiation mean that there will be little chance for substantial justice if the licensee and its insuror, on the one

[1] Public Health Service Publication No. 336, p. 26.
[2] Id., p. 20.

hand, and the exposed claimant, on the other, must resort to conventional methods and forums to resolve disputed claims.

NEW COMPENSATION TECHNIQUE REQUIRED

It is not a full answer to give the excess coverage indemnitor wide latitude to effect settlements without regard to established patterns of State (and Federal) liability? The uncertainties inherent in the hazardous effects, the long delay in their potential manifestation, and the wide variation of judgment that will exist in identifying the responsible cause for such manifestations—call for a wholly new technique in the compensation and liability area if fairness to all concerned is to be achieved.

A YARDSTICK TO MEASURE LIABILITY AND COMPENSATION NEEDED

Both in the property contamination and personnel exposure fields a suitable yardstick must be found that will (1) enforce the desired standard of responsibility on licensees and (2) provide fair compensation despite the difficulties of proof and rebuttal of contested damage and injury claims. Two illustrations will point up the need for an objective yardstick:

(1) *Property contamination.*—Assume that a factory engaged in nonnuclear work, is contaminated by the settling out of alpha emitters from some upwind plutonium reactor incident. Who is to say that X number of alpha counts per minute on Y number of square centimeters of floor surface is above or below the level for safe occupancy of that factory? When will the damages for loss of use and occupancy be tolled? There is no objective criterion for assessing the relationship between the existence of surface contamination and the risk of human inhalation or ingestion of particulate emitters, and I understand that the AEC is proposing to abandon the "counts per minute" standard for surface contamination control, for this reason.

(2) *External overexposure.*—Assume that a group of pipefitters working in a reactor area are exposed to a neutron beam as a result of the dislodgment of a neutron velocity selector during pile operations. If they received something less than 25 rems of exposure the likelihood of clinically detectable injury is remote. Yet in the judgment of the biophysicists, these men are now "damaged" goods and less eligible for employment in exposure areas than before. Likewise, the biophysicist will say that their statistical chances for development of cancer have been materially increased. Also, the experts are in general agreement that some shortening of the expected life span has resulted from this overexposure. Nevertheless, none of the pipefitters may ever experience any disability from this single incident and, in the absence of disablement, they are wholly beyond the protection of present compensation statutes. Under all the circumstances, it would be ironical indeed if the negligent licensee were to go entirely free of penalty for this carelessness only because the damaging consequences of his acts are beyond present standards and capabilities of proof.

CONCLUSION

If Congress finds it necessary to extend Federal coverage to the public liability risks of atomic technology, it must go far enough to assure the effectiveness of that coverage as a protection to the public. This requires that the mechanism adopted be adequate to cope with the distinctive characteristics of ionizing radiation. The physiological uncertainties, the latent and cumulative characteristics, and the unprecedented difficulties of proof posed by this hazard, require the adoption of some acceptable yardstick of (1) fair and prompt compensation for overexposures and property contamination where immediate injury or damage may defy proof; and (2) fair penalty for negligence on the part of a licensee whose operations cause any overexposure of personnel or property contamination.

Except in some areas of the property-contaminated hazard, the accepted unit of absorbed ionizing radiation (the "rem") could be adopted as the yardstick for penalty and compensation purposes. If a fair money value were then attached to this unit, it would be possible to avoid the inequities that will otherwise surely follow, if the parties are left to conventional means of settlement. To derive the full benefit of certainty in this new field and to stabilize the financial risks involved, such a yardstick mechanism of penalty and compensation must be given

a superseding effect over State compensation and liability laws, to the extent that individual claimants elected to accept the benefits of the Federal coverage.

If the logic of this approach appeals to you in the Federal excess coverage field, it may not be too late to establish a parallel pattern in the primary insurance area, by means of special terms of facility licenses, to be worked out under an authorizing Federal statute.

While the foregoing suggestions are by no means a full answer to this problem, I hope this letter will serve to identify one aspect of the proposed measure which deserves further attention.

I appreciate the opportunity afforded me to submit these comments.

Sincerely yours,

BIGELOW BOYSEN, *Director.*

AMERICAN PUBLIC POWER ASSOCIATION,
Washington, D. C., June 11, 1956.

Senator CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Senate Office Building, Washington, D. C.

DEAR SENATOR ANDERSON: Thank you very much for your letter of May 31 and your telegram of June 2 about the proposed legislation on Government indemnity or insurance covering public liability of companies engaged in activities in the atomic-energy field. I greatly appreciate your invitation to testify on the proposed bills. However, I have only a few specific comments to add to my statement of May 17 on this subject before your committee and I know too that the joint committee desires to spend no more time than absolutely necessary on additional hearings on this legislation. Consequently, rather than testifying further before the joint committee, I will express the views of the association in this letter. I respectfully request that you insert this letter in the printed hearings on this subject.

Of the two bills on which you have invited comments, S. 3929 and H. R. 11242, the American Public Power Association would strongly prefer S. 3929. Our objections to H. R. 11242 are set forth in my prepared statement of May 17 before your committee, in my comments on the bill proposed on May 15 by the Atomic Energy Commission. For the sake of brevity, I will not repeat those objections here except to say that in our opinion H. R. 11242 would not provide adequate protection to the public, and would set up unnecessarily complicated and otherwise undesirable arrangements for Federal insurance and reinsurance programs.

S. 3929, on the other hand, appears to provide adequate protection to the public, assuming that the limit of $500 million per accident is sufficient, and proposes a straightforward method for providing the Government indemnity. As I commented in my May 17 statement, it has the possible disadvantage of assigning to the AEC a considerable amount of additional authority in connection with non-Federal atomic power projects. Under the bill, AEC will determine the amount of private insurance to be carried by each licensee, a decision which may well have considerable impact on the economics of atomic powerplants, and perhaps on the private insurance industry as well.

In this connection, I should like to suggest clarification of some of the language in section 170 of S. 3929. It seems to me that the language of subsection (a) is inconsistent with the language and apparent intent of subsection (b). Subsection (a) states that a licensee must have financial protection "of such a type and in such amounts as the Commission shall determine to be reasonably adequate to cover public liability claims * * *." This phrasing is, I believe, unfortunate because it implies that the type and amount of protection to be carried will bear some direct relationship to the amount of damage expected from an accident and the magnitude of the claims which might arise therefrom. On the other hand, subsection (b) of section 170 appropriately requires that in determining the amounts that are "reasonably adequate" the Commission shall consider a number of factors which have to do not with the adequacy of protection but primarily with the financial ability of the licensee to pay the costs of private insurance. For example, under subsection (b), it seems possible that a high-risk facility might be required to carry a lesser amount of private insurance than a low-risk facility if the unit cost of private insurance was markedly higher for the former. This might be an appropriate decision but how could it be reconciled with the "reasonably adequate" finding required by subsection (a)?

I believe that it is both reasonable and realistic to require the Commission to take into account the factors listed in subsection (b) in determining the amount of financial protection to be required of a licensee. But it seems to me somewhat misleading to state in subsection (a) that this amount shall be "reasonably adequate to cover public liability claims." I would suggest that the words "reasonably adequate" be deleted from subsection (a) and the word "reasonable" be substituted therefor. The present subsection (b) then would follow along logically as an explanation of the factors for AEC consideration in determining the reasonable amount of private insurance to be required in each case.

Subsection (f) of S. 3929 authorizes AEC to charge for the right of indemnification on a flexible basis for facilities licensed under section 104 and this seems to us reasonable. We are concerned, however, about the flat charge of $10,000 for section 103 licenses as far as small atomic powerplants are concerned. Although this would be a reasonable and even nominal charge for a large plant, it would amount to 0.2 mill per kilowatt-hour for a 10,000-kilowatt plant operated at 50 percent load factor, and a proportionately larger amount for smaller plants. A "package" powerplant of 2,000 kilowatts would be faced with a cost of 1 mill per kilowatt-hour for indemnity protection alone. Thus, the costs for indemnity would be appreciable for the small plants although the liability would be greatly less than in the case of the large plants.

Since the proposal to make a flat charge favors artifically the economics of large plants, which are already more favorable than those of small plants, and since the potential for damage in the event of an accident is much less in the case of a small plant, we strongly recommend that the charge to section 103 licensees be considerably less than $10,000 for small plants and related at least roughly to the size of the facility.

As I mentioned in my May 17 statement, one aspect of both S. 3929 and H. R. 11242 that particularly concerns us is the implicit assumption that there are no insurance problems in connection with workmen's compensation, fire and extended coverage, machinery breakdown, and loss of use. The member of our association which has endeavored to establish the availability of these additional and essential types of insurance for the project it has proposed to AEC, Consumers Public Power District of Nebraska, has had no success in obtaining any assurances from the private insurance companies that they will be able to provide such coverages, and at reasonable costs. Despite public statements by representatives of the insurance industry that adequate amounts of these other types of insurance will be available at acceptable rates, Consumers' experience suggests that other insurance problems, in addition to public liability, may prove to be serious.

I should like also to repeat a suggestion made in my May 17 statement. It seems to us that, having accepted the major share of the public-liability burden, the Government should assure itself to the extent reasonably possible that no atomic powerplant or other production or utilization facility is licensed unless it is designed and located so as to limit the public-liability risk. I recommend that S. 3929 be amended to include a section setting forth such a requirement.

The comments on additional points by Mr. R. L. Schacht, of Consumers Public Power District, in his letter to you of June 7, 1956, seem to be well taken and I concur in his suggestions.

Thank you again for this further opportunity to comment on the proposed insurance legislation. I have been impressed by the thoughtful manner in which your committee has approached this important problem and I hope that our comments have been of some value to you.

Sincerely,

WILLIAM S. PETERSON, *President.*
(By A. R.).

P. S.—Although this letter is signed for Mr. Peterson in his absence he personally reviewed the proposed legislation and approved this letter in draft form.

ALEX RADIN.

NATIONAL COAL ASSOCIATION,
Washington 5, D. C., June 5, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Capitol Building, Washington, D. C.

DEAR MR. CHAIRMAN: In your letter of May 31, you ask for my comments on S. 3929 and H. R. 11242, which deal with the indemnity and insurance problem facing the atomic energy industry.

We believe both these proposals are deficient in the folowing respects:

1. Neither S. 3929 nor H. R. 11242 would impose a requirement that nuclear power reactors subsidized through this indemnity program should be built in locations which are reasonably isolated from large centers of population.

2. Neither S. 3929 nor H. R. 11242 limit the indemnity program to the present reactor development program. The 10-year period during which indemnity contracts could be entered into should at least be reduced to a reasonable period of time, such as 5 years.

3. Neither S. 3929 nor H. R. 11242 establishes machinery to determine the reasonable cost of the Federal subsidy involved in the indemnity program. We recognize that this cost must be borne by the taxpayers, but we believe the public should know how much subsidy is involved.

In my appearance before your committee on May 18, 1956, I set forth detailed reasons for the coal industry's position on these three points. A copy of my statement is attached for ready reference.

It appears that S. 3929 is seriously deficient in another respect. As we interpret the bill, it would provide indemnity up to $500 million, over and above the amount available from non-Government sources, and would bar any liability on the part of the operator over and above that amount. From the information which is available to the public, it appears quite possible that a reactor incident could result in damages far in excess of this amount. Therefore, S. 3929 appears to deprive the public of the right of redress for damages which may be inflicted through the operation of atomic powerplants. Whatever benefits might be derived from atomic power in the foreseeable future appear insufficient to warrant the taking of life or property without redress.

Very truly yours,

TOM PICKETT,
Executive Vice President.

ASSOCIATION OF CASUALTY AND SURETY COMPANIES,
New York, N. Y.

MEMORANDUM RE H. R. 11242, BY MR. COLE, AN ACT TO AMEND CHAPTER 14 OF THE ATOMIC ENERGY ACT OF 1954, AND RE S. 3929, BY MR. ANDERSON, A BILL TO AMEND THE ATOMIC ENERGY ACT OF 1954, AS AMENDED, AND FOR OTHER PURPOSES

This memorandum is submitted on behalf of the Association of Casualty & Surety Companies, 60 John Street, New York 38, N. Y., an organization whose membership consists of 138 stock insurance companies writing casualty and surety business.

We respectfully register our opposition to H. R. 11242. This bill would authorize the Government to provide indemnification to licensees at an annual charge for such indemnity coverage, and also would authorize the Government to enter into agreements with private insurance companies, reinsuring such companies for insurance coverage provided by them to any holder of a permit or license. In both respects we believe this puts the Government into the insurance business and forthat reason we are opposed to the legislation.

We favor and support S. 3929 in principle, except with respect to the following:

1. In section 3, paragraph a of the bill, the amount of financial protection to be required of a licensee is left to the discretion of the Atomic Energy Commission. In paragraph b, certain factors are specified to be taken into consideration by the Commission in determining the amount of financial protection. Under these provisions, the Commission is given wide discretion as to the amount of financial protection to be required. As we understand it, the Commission could fix this at variable amounts, taking the factors prescribed in paragraph b into consideration. Such amount could conceivably be fixed in a sum less than the amount of insurance available from private insurance companies. It seems to us that it would be preferable for the legislation to spell out specifically that the amount of financial protection to be required shall in no event be less than the total amount of insurance available from private insurance companies, as determined by the Commission at the time of application for license.

2. We respectfully take exception to the provision in (2) of paragraph b, on page 3, which allows the Commission in fixing the amount of financial protection to be required to take into account "the cost of such insurance." This, to us, appears to be an indirect attempt to regulate insurance companies' rates, which are, and should remain, under the control of the State regulatory authorities.

We respectfully submit that there is no valid basis for the inclusion of the factor of cost of insurance in determining the point above which the Government's indemnification will be available.

3. In paragraph f, on page 6 of the bill, the Commission is authorized to make a charge of $10,000 a year for the right of indemnification given to licensees with the right to reduce this charge based on factors specified in the paragraph.

We believe it quite evident that the charge made in this paragraph is merely an arbitrary nominal figure, having no relation to the Government's exposure in connection with the indemnification provided. Nevertheless, as worded, this provision creates the impression that the charge is in the nature of an insurance premium. We are certain it was not intended that this charge was to be anything in the nature of a yardstick to measure the cost of private insurance, but we are nonetheless concerned as to its possible implications in that direction. Since we are certain that this charge is not intended and obviously could not reflect the cost of the Government's indemnification, and since the charge would produce an inconsequential amount of revenue to the Commission for research and development, we respectfully urge the deletion of this paragraph in the bill. If this is not done, we respectfully suggest the paragraph be amended to make it clear that the amount required be described as a fee to be paid by licensees in addition to all other fees required of them.

We endorse the position taken in the statement by Mr. Charles J. Haugh on behalf of the Nuclear Energy Liability Insurance Association, and support the recommendations made by him.

Respectfully submitted,

ASSOCIATION OF CASUALTY AND SURETY COMPANIES,
By RAY MURPHY, *General Counsel.*

JUNE 13, 1956.

NEW YORK, N. Y., *June 14, 1956.*

Senator CLINTON P. ANDERSON,
Senate Office Building, Washington, D. C.:

We strongly urge amendments to Senate bill 3929 to provide that professional services of insurance brokers and agents be included with "the facilities and services of private insurance companies and established insurance adjustment organizations" for which renumeration is presently provided in section 170 (g) on pages 6 and 7, and to delete specific charge for Government indemnity. Manufacturers and operators in nuclear energy field are among those accustomed to depend on their insurance brokers and agents for advice and services in connection with their complete insurance program, which would include required insurance under section 170 (a) and (b). Thus, such brokers and agents are also entitled to payment for advices and services rendered in connection with the Government indemnity part of their clients' insurance protection. As to alleged indemnity charge of $10,000 for each licensee, such charge has no relation to the risks indemnified, and is misleading as a premium for insurance or indemnification.

We oppose arbitrary determination of cost of private financial protection required and recommend that such cost be charged on finding of the Commission. We question adequacy of Government indemnity to supplier in the event license terminated or expired after August 1, 1966. Further status of Government indemnity is not clear if for any reason part of private financial protection cannot be maintained. Other suggested amendments in letter that follows, but kindly make this telegram part of record of hearings on Senate bill 3929.

THE NATIONAL ASSOCIATION OF INSURANCE BROKERS, INC.

ASSOCIATED FACTORY MUTUAL FIRE INSURANCE COMPANIES,
Providence, R. I., June 12, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Congressional Atomic Energy Committee,
United States Senate, Washington, D. C.

DEAR SENATOR ANDERSON: A reply to your letter of May 31, asking for comments on Senate bill 3929 and H. R. 11242, has been delayed both because of my absence from the office and because of my desire to discuss the two bills with the legal committee of the factory mutuals. We wish to express our feeling that Senate bill 3929, as introduced on behalf of the joint congressional committee, covers

most of the points which we had placed before your group at the hearings on May 16, 1956. The one conspicuous exception is our "point 4," urging that the indemnity program should be applicable to all property except the reactor itself and the associated equipment. The bill, as introduced, merely relieves participants in the atomic energy program from legal liability to third parties and it would in no way indemnify the owner or operator of a nuclear reactor for damage to other property which he also owns.

This point can best be illustrated by considering two examples:

1. A research reactor owned by a large corporation might be involved in an incident with substantial damage to production facilities of the same corporation located nearby. Such damage would not be covered under the indemnity program in the proposed bill.

2. An educational institution with a research reactor located on its campus would have no protection for damage done to the surrounding buildings which are also owned by it in the event of the release of fission products from the reactor.

Many of the provisions of Senate bill 3929 show the effect of your careful study of the testimony put forward at prior hearings. We have no objection to subsection B, which gives the Commission authority to vary the amount of financial protection to be required on the basis of a number of criteria set out in the section. We are also satisfied with subsection F, which gives the Commission the right to vary the charges made for Government indemnity based upon the situation at the facility covered under the program.

We have reviewed House Resolution 11242, which would seem to be modeled on the proposals made to the joint congressional committee by the AEC. It is our belief that S. 3929 would provide for a more workable method of affording protection to the public in the event of an incident involving the release of fission products at either a private reactor or one being operated for the AEC by a contractor than would be the case under the Cole bill.

It will not be possible for us to have a representative at the coming hearings before your committee. This letter may, therefore, be taken as an expression of our views on the legislation in question.

Yours very truly,

AMBROSE B. KELLY, *General Counsel.*

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington 25, D. C., June 15, 1956.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy.
United States Capitol, Washington 25, D. C.

MY DEAR MR. CHAIRMAN: There are now pending before the Joint Committee on Atomic Energy several bills to authorize Federal insurance or indemnity against atomic hazards. The Bureau of the Budget is in full agreement with the desirability of a Federal insurance program if needed to facilitate the speedy development of atomic power by private industry. Because of the importance of the legislation, because it might serve as a precedent for other Federal insurance or indemnity programs, and in the light of our experience with other insurance programs of a novel nature, we believe that the legislation should be based on the following principles:

1. Federal insurance should be made available only to the extent that private insurance on reasonable terms and at reasonable rates is not available. A Federal insurance program should not compete with or substitute for private insurance, but should begin at the point where private insurance ends.

2. Premiums should be charged to reflect the risks. We have no evidence at this time that such premiums would discourage the private development of atomic energy. Indemnity without premiums or with nominal premiums would in effect amount to an additional Federal subsidy in this area.

3. The Atomic Energy Commission should be authorized—in addition to providing direct insurance—to reinsure private insurance companies to the extent that private insurance would not otherwise be available. Reinsurance would be helpful in assuring maximum private participation in the program, minimizing the role of the Federal Government, and facilitating the transition from Federal to private insurance. We recognize that private insurance companies have indicated that they are at present not interested in reinsurance. However,

this is a new and experimental program, the views of private insurancce companies have changed in the past and may change in the future as they gain more experience, and it would, therefore, be desirable to include reinsurance authority to assure needed flexibility.

4. If it is at all practicable, a ceiling should be set on the amount of coverage provided in any one accident, since it is generally not desirable to expose the Government to an unlimited contingent liability. Disasters involving losses above the ceiling could be treated in special legislation, based upon the facts of the specific case.

5. To facilitate sound financing, the financial transactions under this program should be conducted through a separate fund into which premiums would be placed and from which expenses would be paid. To assure speedy payment of claims, we would have no objection to authorizing the Atomic Energy Commission to borrow from the Treasury for this purpose. The receipts or the financing of expenditures of the insurance program should not be tied to other operations of the Atomic Energy Commission.

Of the various bills before your committee, H. R. 11242 most nearly reflects the above principles, and we, therefore, favor its enactment.

Sincerely yours,

PERCIVAL BRUNDAGE, *Director.*

THE LIBRARY OF CONGRESS,
LEGISLATIVE REFERENCE SERVICE,
Washington, D. C., May 15, 1956.

To: Joint Committee on Atomic Energy.
(Attention: Mr. George Norris, counsel.)
From: American Law Division.
Subject: The proposed amendment to the Atomic Energy Act of 1954 relating to indemnification and limitation of liability.

The following confirms our telephone conversation covering preliminary thought after examining the proposed draft. If specific questions are raised later in the hearings, or objections are made to particular legal aspects, we shall be glad to undertake the research necessary to assist you in reaching such conclusions as you may deem necessary.

The proposal follows the general outline, terminology and format of the 1954 act, and appears to be completely consonant with the purposes and objectives established therein. The main constitutional powers involved in this proposal, as we understand it, are those relating to defense, commerce, and general welfare. See particularly chapter 1 of the 1954 act. The circumstances requiring this legislation are, of course, unique. However, this does not necessarily establish a basis for questioning the constitutionality of the solution. Whenever a question arises concerning the constitutionality of a proposed course of action, the first question is whether the power is exressed in the Constitution. If it is not expressed, the second question is whether it is properly an incident to an expressed power or is auxiliary and subordinate thereto, and therefore necessary to its execution. See Story, Commentaries on the Constitution, section 1243. In this particular case we have already noted basic constitutional powers which will be invoked.

Congress can establish the conditions necessary for properly carrying out its constitutional powers with due regard to the unique circumstances which may be involved. It can establish administrative standards to be followed in executing the program and may provide for indemnification even though its obligation is moral rather than legal. See, for example, Public Law 378, 84th Congress and House Report 1305 relating to the Texas City disaster. That assumption by Congress of a nonlegal obligation followed a decision of the United States Supreme Court in *Dalehite* v. *U. S.* ((1953) 346 U. S. 15), wherein it was held that the Government of the United States was not liable under the Federal Tort Claims Act for the damages resulting from that disaster. In recognizing and assuming a moral obligation, Congress may establish limitations. See Public Law 378, supra. Further, the fact that on a given occasion it assumes a particular obligation does not necessarily impel it to assume others. See *U. S.* v. *McDougall's Administrator* ((1887) 121 U. S. 89, 98); *U. S.* v. *Mille Lac Chippewas* ((1913) 229 U. S. 498, 500).

Perhaps the most pressing question which will arise in the hearings concerns the limitation of general liability. We believe that such a limitation cannot be objected to validly in principle. In the Limited Liability Acts, relating to

shipping (U. S. C. 46:181–196), Congress specifically provided necessary protection for the shipping industry by enacting such a limitation. The courts have held that there can be no doubt that Congress had the power to pass such legislation; that it was within the scope of the constitutional power of Congress to regulate commerce. See *Lord* v. *Steamship Co.* ((1880) 102 U. S. 541, 542); *Providence & New York Steamship Co.* v. *Hill Manufacturing Co.* ((1883) 109 U. S. 578, 589), and numerous other cases. In the event of a major disaster, the possibility of which is contemplated in this legislation, insurance and the statutory liabilities may not cover claims. Under such circumstances it seems clear that Congress may invoke the powers granted in article I, section 8, clause 4 of the Constitution by establishing bankruptcy proceedings on a uniform basis, applicable to the situation where there are insufficient assets. After all, if available assets, including insurance, connected with the project are insufficient, there can be no further indemnification, and proceedings in bankruptcy would seem to be the necessary step to be taken to relieve the situation and wipe the slate clean.

The provision creating an indemnification fee of $10,000 per year for commercial licenses granted under section 103 appears to create no general legal problem. Further, the earmarking of such fees for further research would seem to be permissible. For example, the Migratory Bird Hunting Stamp Act (U. S. C. 16:718 et seq.) sets aside revenues for migratory bird sanctuaries. See also *Cincinnati Soap Co.* v. *U. S.* ((1937) 301 U. S. 308), wherein a scheme earmarking certain revenues for the Philippine Treasury was sustained by the United States Supreme Court.

As we have heretofore indicated, these represent our preliminary views and impressions after studying the proposed amendment to the act. If you desire further study, kindly let us know.

FRANK B. HORNE,
American Law Division.

UNITED STATES ATOMIC ENERGY COMMISSION,
Washington, D. C., June 21, 1956.

Mr. JAMES T. RAMEY,
Executive Director, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR MR. RAMEY: This letter is in response to your letter of June 19, 1956, in which you requested the Commission's comments by June 20 on the major aspects of your revised version of S. 3929.

As to the general approach to the indemnity problem we have commented twice in the past and those same comments apply today. However, with respect to the specific provisions of the revised draft of S. 3929 we have three areas of concern. First, we recommend that in line 1 of section 170 (a) there be included a reference which would exclude other Government agencies from the condition requiring financial protection. We feel that such a requirement has no real meaning and could be administratively burdensome. If this suggestion is followed, then there could be deleted from section 170, subparagraph c, line 5, the parenthetical expression "(other than a Government agency)."

Second, section 170 (a) as presently drafted permits the Commission to require financial protection for section 53, 63, or 81 licenses, and section 170 (c) provides indemnity for such licensees. We recommend that any reference to section 63 or section 81 licenses be deleted. In our experience there has been no need evidenced for such coverage. In addition, it would create an excessive workload and would require an increase in staff to investigate the need for financial protection for such source and byproduct material licenses. Should this provision remain in the draft bill, even though permissive, in our opinion, it would result in either public pressure or pressure on the part of licensees, or both, for such coverage. We also want to point out that the criteria with respect to the amount of financial protection to be determined pursuant to section 170 (b) includes a reference to "facility" which would have no applicability to such licenses.

Third, it is our understanding that section 170 (d) would give the Commission additional authority to that which is now available to the Commission to enter into agreements of indemnification with its contractors. We believe it important that this understanding be made clear to all those having an interest in this legislation.

I have been informed by the Office of General Counsel that the foregoing and certain other comments of a minor nature have been discussed with the com-

mittee staff and that all such comments will be considered before the revised draft of S. 3929 is finalized.

The Bureau of the Budget has advised us that it has no objection to the submission of these comments to the Congress.

Sincerely yours,

K. E. FIELDS, *General Manager.*

Representative PRICE. The committee staff will take the various suggestions into account and hopes to have committee action within 10 days or 2 weeks on this proposed legislation.

The committee will stand adjourned.

(Thereupon, at 3:30 p. m., Thursday, June 14, 1956, hearing in the above-entitled matter was adjourned, subject to the call of the Chair.)

APPENDIX

THE BIOLOGICAL EFFECTS OF ATOMIC RADIATION

A Summary Report to the Public From the National Academy of Sciences-National Research Council

Part I. Introduction

Whenever atomic energy is released, there are released with it certain invisible but powerful radiations. It has been known for many years that when these radiations strike living things they cause important changes that are often harmful. It is also known that the changes may not be limited to the plant or animal which receives the radiation, but may be passed on to succeeding generations. However, the details of the action, how much radiation will produce a given result, how much can be done to counteract the deleterious effects, these are largely unsolved problems.

There has always been some radiation in the environment. Radium and other radioactive elements in the ground together with cosmic rays from outer space produce a natural "background" over all parts of the earth. However, as atomic activity is stepped up throughout the world, the amount of radiation in our surroundings may be substantially increased. This could have profound effects on all forms of life. But there has been disturbingly little information about just what the effects may be.

In 1955 Detlev W. Bronk, president of the National Academy of Sciences, appointed a group of scientists to investigate the effects of high-energy radiation on living things. Funds were provided by the Rockefeller Foundation.

The study is divided into six parts, each assigned to a separate committee. The areas under consideration are (1) genetics, (2) pathology, (3) agriculture and food supplies, (4) meterology, (5) oceanography and fisheries, and (6) disposal of radioactive wastes. A list of the membership of each committee appeas at the end of this report.

The scientists have now sifted the present knowledge in the field, and have marked out the areas in which further research is most needed. Their study will be a continuing one since many of the problems involve basic scientific questions which will take many years to answer. Also, new questions may be expected to arise as the uses of atomic energy expand.

The present report summarizes the findings to date. It is intended for the lay reader and extracts from the more detailed reports being published at the same time those aspects which are of most general interest. The purpose is (1) to tell the citizen what science has learned thus far about the potential effects of atomic radiation on himself and his progeny, and on the race as a whole; (2) to give him such information as scientists can now provide to help him participate more intelligently in making necessary public decisions about atomic energy.

It should be emphasized that he will find here only scientific data. Most of the decisions he will be faced with involve ethical, political, economic, or military questions as well. These can be more usefully debated, however, against an adequate technical background.

Behind any discussion of radiation must necessarily loom the specter of full-scale atomic war. That a single thermonuclear weapon can cause severe radiation damage hundreds of miles beyond its aren of immediate devastation is all too well known. That enough such weapons exploded in an all-out war might render the entire earth, or large parts of it, uninhabitable, is at least conceivable.

The actual results would depend on the number, the types, and the location of the explosions that actually took place. There has been comparatively little

attempt in the study thus far to estimate the possible courses of atomic warfare or to assess the biological consequences. The present emphasis has been on peaceful development .

It may be pointed out, however, that so far as radiation is concerned, the two aspects are not entirely unrelated. In the first place, when a worldwide atomic power industry becomes fully developed, its accumulated waste products might represent more radiation than would be released in an atomic war. Of course, this radiation will be imprisoned, not broadcast. But the point underscores the magnitude of the coming problem.

Secondly, it becomes clear in this report that even very low levels of radiation can have serious biological effects. In several instances the size of the effect turns out to depend directly on the amounts of radiation. Thus, many of the disastrous consequences of atomic war are clearly implied in this investigation of peacetime problems.

Part II. Brief Digest of Findings and Recommendations

It is generally agreed that, in the peacetime development of atomic energy, man has been lucky. He has been dealing with an enormous new force whose potential effects he has only dimly understood. Thus far, except for some tragic accidents affecting small numbers of people, the biological damage from peacetime activities (including the testing of atomic weapons) has been essentially negligible. Furthermore, it appears that radiaion problems, if they are met intelligently and vigilantly, need not stand in the way of the large-scale development of atomic energy. The continuing need for intelligence and vigilance cannot be too strongly emphasized, however.

The problems of radiation fall naturally into two main classes: (1) The effects on human beings; (2) the various ways in which radiation can reach human beings through the environment.

EFFECTS ON HUMANS

The inheritance mechanism is by far the most sensitive to radiation of any biological system.

Any radiation which reaches the reproductive cells causes mutations (changes in the material governing heredity) that are passed on to succeeding generations.

Human gene mutations which produce observable effects are believed to be universally harmful.

Everyone is subjected to the natural background radiation which causes an unavoidable quantity of so-called spontaneous mutations. Anything that adds radiation to this naturally occurring background rate causes further mutations, and is genetically harmful.

There is no minimum amount of radiation which must be exceeded before mutations occur. Any amount, however small, that reaches the reproductive cells can cause a correspondingly small number of mutations. The more radiation, the more mutations.

The harm is cumulative. The genetic damage done by radiation builds up as the radiation is received, and depends on the total accumulated gonad dose received by people from their own conception to the conception of their last child.

So far as individuals are concerned, not all mutant genes or combinations of mutant genes are equally harmful. A few may cause very serious handicaps, many others may produce much smaller harm, or even no apparent damage.

But from the point of view of the total and eventual damage to the entire population, every mutation causes roughly the same amount of harm. This is because mutant genes can only disappear when the inheritance line in which they are carried dies out. In cases of severe and obvious damage this may happen in the first generation; in other cases it may require hundreds of generations.

Thus, for the general population, and in the long run, a little radiation to a lot of people is as harmful as a lot of radiation to a few, since the total number of mutant genes can be the same in the two cases.

It is difficult to arrive at a figure showing how much genetic harm radiation can do. One measure is the amount of radiation, above the natural background, which would produce as many mutations again as occur spontaneously. It is estimated that this amount is 30 to 80 roentgens.

(The roentgen is a unit of radiation. To give an idea of its value, the average dental X-ray delivers five roentgens to the patient's jaw, but only five-thousandths of a roentgen of stray radiation to more remote parts of the body such as the gonads.)

It is also estimated that a dose of 10 roentgens to every person in the United States would cause something on the order of 5 million mutant genes which would then be a part of the population's inheritance pool. This figure is subject to considerable uncertainty.

At present, the United States population is exposed to radiation from (a) the natural background, (b) medical and dental X-rays, (c) fallout from the atomic weapons testing. The 30-year dose to the gonads received by the average person from each of these sources is estimated as follows:

(a) Background—about 4.3 roentgens.

(b) X-rays and fluoroscopy—about 3 roentgens.

(c) Weapons tests—if continued at the rate of the past 5 years would give a probable 30-year dose of about 0.1 roentgen. This figure may be off by a factor of 5, i. e., the possible range is from 0.02 to 0.5 roentgens. If tests were conducted at the rate of the two most active years (1953 and 1955) the 30-year dose would be about twice as great as that just stated.

If the exposure of the general population to radiation is limited to levels which the genetics committee believes reasonable (see recommendations at the end of this part), there should be practically no pathological effects in the persons receiving the radiation.

Larger exposures (say 100 roentgens and up) of the whole body or a large part of it are generally harmful. (Much higher doses may, however, be safely and usefully delivered to limited portions of the body under the controlled conditions of medical treatment.) Very little is now know about how to treat the pathological effects of radiation or how to protect the body against them in the first place. Much research is needed in these fields.

One of the effects is a shortening of life. This seems to involve some generalized action. Irradiated individuals may age faster than normally even if they do not develop specific radiation-induced diseases like leukemia. It has not been shown that exposures small enough to be genetically tolerable have this effect. Furthermore, the permissible exposure levels that have been established for persons working with radiation appear to be within the limits of safety. However, it is not yet known what minimum dose, if any, would be necessary to produce a statistically noticeable reduction of life span when very large numbers of people are concerned.

ENVIRONMENT AND FOOD SUPPLY

Radation in the general environment has not yet become a serious problem. In a few decades, however, radioactive waste products from atomic powerplants will represent an enormous potential source of contamination. How much of this radioactivity will actually reach the population depends on how successfully it can be kept out of the great network—ocean and air currents, food and water supplies—which connect man to his surroundings.

At present test explosions of atomic weapons are the only significant source of radiation in the general environment, above the natural background.

Meteorologists have found no evidence that atomic explosions have changed the weather or climate. Nor do they believe that continued weapons tests, at the same rate and in the same areas as in the past, would have such an effect.

Radiation from explosions passes into the atmosphere and much of it eventually returns to the ground as fallout.

Fallout divides into three classes: (1) Close-in—material that comes down within a few hundred miles of the explosion and within 10 to 20 hours; (2) intermediate—material that descends in a few weeks after the explosion; (3) delayed—material that remains in the air for months or years.

Close-in fallout from test explosions affects only restricted, uninhabited regions.

Intermediate fallout would descend very slowly if it were pulled down only by gravity. It is mostly washed out of the air by rain and snow. It spreads over large parts of the earth, but its effect over a small area may be accentuated if there is heavy precipitation while the radioactive cloud is overhead.

Delayed fallout is stored for long periods in the stratosphere. Meteorologists know very litle about the interchange of air between the stratosphere and lower layers, so they cannot predict exactly how long the material will stay up, or where it is likely to descend.

At this point the oceans are not receiving any significant quantities of radioactive material. But eventually they will undoubtedly be used as a repository for some of the radioactive waste products of atomic powerplants.

Before this can safely begin on a large scale, much research is needed to determine the mixing rates between various parts of the seas. Materials deposited in some of the deep parts of the ocean may remain there 100 years or more, so that most of their radioactivity would be gone before they reach surface water. On the other hand, material dumped into coastal and other surface waters would directly affect marine life and, within a few years, would contaminate all parts of the world because of the relatively rapid circulation of surface layers.

Radioactive tracers can be used to chart ocean and air currents and to study the interrelationships of marine animals. Many important experiments in these fields will be possible only within the next 10 or 20 years. Increasing radioactive contamination of the sea and atmosphere will make it impossible after that to detect the tracers against the hightened background.

Radiation from fallout inevitably contaminates man's food supply. Radioactive elements in the soil are taken up and concentrated by plants. The plants may be eaten by humans, or by animals which in turn serve as human food.

At present the contamination is negligible. But the maximum tolerable level is not known. There is not nearly enough information about the long-term biological effects on man or animals from eating radiation-contaminated food. Research in this area is urgently needed.

Probably the most important potential food contaminant is strontium 90—a radioactive element that concentrates in bone tissue. Already, detectable although biologically insignificant traces of it have turned up in milk supplies thousands of miles from the site of atomic explosions.

Food from the oceans is also subject to radioactive contamination. Marine plants and animals extract and concentrate various radioactive elements that get into sea water. The concentration is cumulative, increasing as it proceeds up the chain from microscopic plankton to edible fish.

Properly used, radiation can enhance man's food supply rather than damage it. Radiation techniques have already opened important new fields in agricultural research and will undoubtedly become increasingly valuable. No drastic change in agricultural production appears imminent, however.

Tracer studies will help us understand basic metabolic processes in plants and animals. They will also be applied to practical problems such as the use of fertilizers.

Mutation rates in plants are being artificially speeded up with radiation in the hope of producing new and superior strains. Thus, far, only a few new economic varieties have been found, but the method is promising. The use of radiation to sterilize packaged food may have dramatic impact on food technology by reducing the need for refrigeration and extending the shelf-life of many products.

Holding radiation to a tolerable worldwide level will require adequate methods for disposing of, or, rather, for containing radioactive wastes from power reactors.

Some of these wastes will remain dangerously radioactive for centuries.

Research has indicated some apparently feasible systems for controlled disposal, but none is yet at the point of economic operating reality.

The major problem in routine disposal is what to do with the wastes resulting from the processing of reactor fuel. The wastes from normal operations of reactors themselves can be more easily handled.

A second major problem is to anticipate the accidents that will inevitably occur and to set up safety standards which will insure that they do not become catastrophes.

Considered in this light, it appears feasible to use nuclear reactors in central station powerplants and in naval vessels.

RECOMMENDATIONS

In the light of these findings the study committees have made a number of recommendations. Those of the genetics committee apply most directly to all of us. They are:

(I) Records should be kept for every individual, showing his total accumulated lifetime exposure to radiation.

(II) The medical use of X-rays should be reduced as much as is consistent with medical necessity.

(III) The average exposure of the population's reproductive cells to radiation above the natural background should be limited to 10 roentgens from conception to age 30.

(IV) The 10-roentgen limit should be reconsidered periodically with a view to keeping the reproductive cell exposure at the lowest practicable level.

(V) Individual persons should not receive a total accumulated dose to the reproductive cells of more than 50 roentgens up to age 30 years, and not more than 50 roentgens additional up to age 40. (About half of all United States children are born to parents under 30, nine-tenths to parents under 40.)

Other recommendations of general interest are:

(VI) Techniques for monitoring worldwide fallout should be further improved.

(VII) Measurements of the storage of radiation in the stratosphere should be continued and extended.

(VIII) A national agency should control and keep records of all dumping of radioactive material in the ocean.

(IX) An international body should set up safe standards for the marine and air disposal of radioactive materials as soon as possible, based on current knowledge.

(X) Research in marine disposal should be carried out on a cooperative international basis.

(XI) Until advances in reactor technology substantially reduce potential hazards buildings that house reactors located near populated areas should be sealed against the release of radioactive materials in the event of accident.

(XII) Research should be continued and accelerated, particularly in the fields of:

Fundamental genetics, mammalian genetics, human and population genetics.

Pathological effects of radiation.

Mixing between various parts of the atmosphere.

Mixing between various parts of the oceans.

The role of plants and animals, both on land and in the oceans, in concentrating radioactive materials.

The tolerable levels of radioactivity in human and animal food.

Geophysical and geochemical aspects of the ultimate disposal of radioactive wastes.

Selection of biologically suitable sites for various atomic facilities.

Safety devices for the control of accidental power surges in reactors.

Part III. The Nature of Radiation

Broadly speaking, radiation is a way in which energy moves from one place to another. Thus, the energy released when a stone is dropped into water radiates away in circular waves. Sound energy radiates from a speaker's mouth to a listener's ear; light and heat energy radiate from the sun to the earth. Electrons, radiating from a hot wire, provide the energy that forms the picture in a television set. In the first four examples the radiation consists of waves—water waves, sound waves, light waves, heat waves. In the last, the radiation is a stream of minute particles.

Here we are concerned with atomic radiation. It also transports energy, carrying it away from over-energetic atoms. X-rays, the most familiar example, are waves, like light waves, only very much shorter. To give some idea of the scale, a water wave or a sound wave may be inches or feet long; a light wave is about a hundred thousandth of an inch long; a medium-short X-ray, about a billionth of an inch. Another group of atomic radiations, called gamma rays, are like X-rays, but are usually still shorter. Their wave length goes down to about a 10-billionth of an inch.

One of the major discoveries of modern physics is that the shorter the wavelength of any wave radiation, the more energy each unit of it carries. Hence, X-rays and gamma rays are enormously more energetic than light. They penetrate much farther into all kinds of matter, and they produce much larger effects.

In addition to waves, atoms are now known to radiate a great variety of particles. These are all unimaginably tiny (measured in 100-trillionths of an inch), unimaginably light, and known to us only indirectly through their effects. Some of the more important particles are:

Electrons.—The lightest particles, carrying a negative electric charge. Radiation electrons are sometimes called beta rays.

Protons.—About 2,000 times as heavy as electrons and positively charged.
Neutrons.—Like protons, but uncharged.
Alpha particles.—Each one is an assemblage of two protons and two neutrons.

WHAT PRODUCES RADIATION?

Atomic radiation is given off by atoms which have more than the normal complement of energy—excited atoms in the physicists' phrase. Before describing excited atoms, however, we should pause very briefly to recall what an atom is. Every atom is composed of a tiny, positively charged nucleus surrounded by a cloud or swarm of negative electrons. The nucleus accounts for almost all the atom's weight and is composed of protons and neutrons.

The number of protons in a nucleus determines the chemical properties of the atom; each element has a unique and characteristic number of protons. The number of protons and neutrons together determines the weight of the atom. Two atoms having the same number of protons but different numbers of neutrons are said to be isotopes of the same element.

How does an atom get "excited"? One way is to be struck by a projectile. There is nothing very mysterious about this. If a bullet strikes a metal target, energy is added to the target—it is excited. This energy is then radiated away, in the form of waves which carry off the noise and heat of impact. There may also be particle radiation if the bullet knocks some pieces out of the target. In the same way, a bullet of atomic dimensions excites an atom that it strikes. The excess energy is radiated away in the form of waves (X-rays, gamma rays), particles (fragments from the target atoms), or both.

In an X-ray machine, a stream of fast-moving electrons is made to strike a metal target. This excites some of the electrons in the atoms of the target. In the process of giving off the excess energy thus gained, the atomic electrons send out X-rays.

With the exception of X-rays, the radiation we are interested in comes from the nuclei of atoms rather than from their electron clouds. The big atom-smashing machines one reads about are simply devices for hurling various particles against nuclei. The target nuclei then spew out radiation, including gamma rays and a great variety of particles.

Not all radiation comes from atomic collisions, however. Some atoms are naturally excited, and emit radiation spontaneously. These are the atoms of radioactive substances such as radium. The nuclei of radioactive atoms erupt from time to time, giving off alpha particles, electrons or gamma rays.

Since each atom is characterized by the number of particles in its nucleus, when a radioactive nucleus throws off a particle the atom changes either into another element or into another isotope of its own species. The new nucleus may in turn be unstable and emit further radiation. Eventually, after a series of transmutations, every radio-active atom ends up as a stable element and stops radiating. For example the familiar radioactive elements such as radium and uranium end up as lead.

Different radioactive elements vary greatly in the frequency with which their atoms erupt. In some substances eruptions are comparatively rare. The atoms are somewhat like popcorn that is just beginning to heat up—only an occasional kernel pops. In other substances the atoms go off very frequently, like popcorn that is fully heated. Those substances in which there are infrequent explosions are comparatively weak sources of radiation, since radiation is produced by the explosion. On the other hand, these materials have a long life—that is, it takes a long time before all their atoms have transmuted themselves into other elements. Those in which explosions are frequent radiate strongly but have a short life. The time spread here is enormous. Short-lived radioactive substances may exhaust themselves in minutes, seconds, even millionths of a second. Long-lived materials may remain little changed for thousands, even millions of years.

The rate of radioactive decay is usually measured in half-life—the time required for half of any amount of radioactive material to transmute itself. Thus, if the half-life of a substance is 1 hour, half of any starting amount will be gone in an hour, half of what is left will go in the second hour, and so on. In 10 half-lives, the amount of any radioactive substance is reduced to one-tenth of 1 percent.

Two important sources of radiation, as we have said, are naturally radioactive atoms and atoms made artificially radioactive by bombardment. We also receive radiation from the high-energy particles called cosmic rays, which rain

on the earth from outer space. As the power program expands, however, the radiation from these other sources will fade into insignificance compared with that from the basic atomic energy process—nuclear fission.

When certain atomic nuclei, notably those of uranium and plutonium, are struck by neutrons, they do not radiate in the usual way. Instead, they split into two roughly equal parts and give off a large burst of energy. It is this energy that provides the explosive power of an atomic bomb, and that can be converted into useful power in an atomic pile.

Our concern is not with the energy, but with the nuclear fragments that are produced—the so-called fission products. The point is that in even the smallest bomb, or the most modest experimental nuclear reactor, there are trillions upon uncounted trillions of these fragments. The fission products are invariably unstable atoms; every one of them is radioactive. They include a wide variety of radioactive elements, ranging from very short-lived to very long-lived ones. The more bombs that are exploded, the more of these radioactive fragments are scattered broadcast over the earth. The more power reactors that go into operation, the more radioactive material must be disposed of. The disposal problem will arise chiefly when spent fuel from reactors is processed; that is, when the accumulated fission products are removed and the fuel reconstituted for further use.

MEASUREMENT OF RADIATION

The strength of radiation can be measured in many different ways. The unit we are using in this report is called a roentgen. Its technical definition[1] involves the ability of radiation to knock electrons out of air molecules (i. e., to ionize them). This is, unfortunately, not very meaningful to a nonspecialist. As has already been pointed out, a rough idea of the size of the unit can be obtained from the fact that an average dental X-ray delivers five roentgens of radiation to the skin of the patient's jaw (but only five thousandths of a roentgen to parts of the body as distant as the gonads).

WHAT DOES RADIATION DO TO LIVING THINGS?

This is the big question being dealt with in the study. In a very general way it is not hard to answer. When radiating waves or particles pass through any substance, at least some of them bump into molecules. The effect may be no more than to knock a few electrons out of the molecules, or it may be more drastic. But even if just a few electrons are knocked loose, the molecules become very active chemically, and form new combinations. Now a living cell is a marvelously delicate balance of interacting materials. Each molecule must be just what it is to play its proper role. Hence any chemical change in a cell, however slight, may have serious effects. It may substantially change the normal life processes, or even kill the cell.

When a complex organism is exposed to radiation the degree of damage, if any, depends on which of its body cells have been affected. The more vital parts are generally some distance in from the surface. Hence radiation coming from the outside is more harmful if it can penetrate to these parts than if it cannot. X-rays and gamma rays are very penetrating; particle radiation much less so. Most of the energy in a beam of particles is lost in the outermost layers of any organism it strikes. Radiation may also originate inside the organism. (Plants make take radioactive material up from the soil, animals may eat or inhale it.) If the material concentrates in or near vital tissue, its radiation need not be penetrating to be very damaging.

WHAT RADIATION ARE WE EXPOSED TO?

Wherever one goes over the surface of the earth, there is always a small amount of radiation, more in some places than in others. It is called background radiation. It comes from two sources. One is the naturally radioactive substances—uranium, radium, and so on—that are found in rocks and the soil. Of course, the percentage of radioactive deposits varies widely from place to place. The other is cosmic radiation. Cosmic rays are absorbed as they pass

[1] The definition actually reads: "A roentgen is the quantity of radiation such that the associated corpuscular emission per 0.001293 grams of air produces, in air, ions carrying 1 electrostatic unit of quantity electricity of either sign."

downward through the atmosphere, so that background radiation from this source is greater the higher one goes.

There are naturally occurring radioactive atoms within living plants and animals, as well as in the earth. Thus every living thing is exposed to its own radiation as well as that from the external background.

Over and above the background, there are the various forms of manmade radiation to reckon with. At this point, in industrially advanced countries, by far the most important are medical and dental X-rays. The average United States citizen now receives roughly the same amount of radiation, over his whole body, from X-ray and fluoroscopic examination as from the natural background.

Another source of radiation—a minor source so far—is fallout from atomic explosions. Every bomb or device that is set off throws into the air a huge cloud of radioactive particles, some of which are carried great distances by the winds of the upper air, and settle out gradually over the whole earth.

At the present time, atomic reactors are not a factor in the general radiation picture. But when large numbers of nuclear power plants are in operation, the output of radioactive fission products will be enormous. The ingenuity and care used in the management and release of these wastes will determine how much of their radiation passes into the general environment.

Part IV. Summaries of the Study Committee's Reports

1. GENETICS

We come now to the findings of the study committees. There are at least two good reasons for beginning with genetics. All of us tend to be more concerned for our children than for ourselves. And, as we shall see, the inheritance mechanism is by far the most sensitive to radiation of all biological systems.

Only the high points of what the genetics committee has to say are presented here. The problems of human genetics are complex and subtle, and a brief statement cannot do them justice. The full report has been written for a general public, and copies of it are available.

A summary of the committee's findings will not be very meaningful unless one knows a little about how biological inheritance works. The following paragraphs are a very brief, and oversimplified outline of a few of the fundamental facts of genetics.

Every cell in the human body (and in every other living organism) contains an enormous collection of tiny units called genes. Taken together they substantially determine all the characteristics the individual is born with. Each person gets his genes from his parents, who got them from theirs, and so on.

Genes come in pairs, one of each pair inherited from the father and one from the mother. Every characteristic is governed by one or more pairs. For example, there are genes which have to do with hair color, others which control stature and so on.

This is the way the gene pairs are acquired: Sperm and egg cells have single sets of genes rather than pairs. When a sperm and egg unite to form the first cell of a new embryo, there is a new double set, half coming from the father and half from the mother. As the embryo develops, this set is duplicated over and over again through the successive divisions of the cell, so that every cell in the body of the fully developed infant has an essentially identical set of genes.

Just which gene a child inherits from each of his mother's and father's gene pairs is a matter of chance. Sperm and egg cells are produced by a splitting of cells in the sex glands or gonads. When the cells split, the gene pairs divide up at random.

From all this it is obvious that the two genes in each pair are not necessarily or even usually identical. Thus, if a child inherits a gene tending to produce red hair, say, from his father, there is an excellent chance that the corresponding maternal gene will have some other color tendency. How is the characteristic then determined? What color will the child's hair be? The answer is that in each pair of genes, one almost always has a stronger effect than the other and largely determines the characteristic involved. This is called a dominant gene. The weaker member is called a recessive gene. In the usual case, the recessive's effect is not completely submerged. Thus, in our example, the principal gene for red hair is recessive. The child who carries one such gene will have black hair, or brown or blond, but it will very likely have a rusty, or tawny tinge. To

make him a true redhead, both of the principal genes would have to be the type for red. In general, a recessive characteristic can be fully realized only in the cases when both genes of a pair are the recessive type.

Mutations

The endless reduplication of genetic patterns, from cell to cell and from generation to generation, is not the least of the wonders of life; but the patterns are not eternally static. Every so often a gene changes or mutates and a characteristic of the organism is altered. Presumably a changeling gene undergoes some chemical rearrangement, although we do not yet know any of the details of the process. We do, however, know a number of ways to bring about mutations. Heat, certain chemicals and—especially—radiation will do it. And once changed, the new form of the gene is then passed on as faithfully as the old one was.

Now, as has already been pointed out, the processes of life are so delicately balanced that any change, any departure from the established order of things at the cellular level, is overwhelmingly likely to be for the worse. Mutations almost invariably harm the organism in which they occur.

To be sure, very infrequently a mutation will turn out to be helpful. Evolution has depended on a sequence of rare mutations, each of which produced an organism slightly better equipped than its ancestors to deal with the environment. Plant breeders are continually looking for helpful mutations that will give improved crop varieties. But the exceptions merely prove the rule: most mutations are harmful.

If mutations takes place in an ordinary body cell, the effect is usually not serious. In any case, the damage is primarily restricted to the individual in whom the change occurred.

But the situation is quite different if the gene affected is located in the reproductive cells of the sex glands. Then the damage can be passed on through the sperm or eggs produced by these cells, to the individual's children, thence to their children, and so on.

With this background, we turn to the committee's report.

Radiation genetics—basic facts

To begin with, the group points out that most of what is known about genetics comes from studies on lower forms of life. Knowledge of human genetics is rather limited. Fortunately, the main pattern of heredity is the same for all forms of life reproducing sexually. Also, the action of high-energy radiations upon the genetic material is universally the same in principle.

Thus although there are many uncertainties about details and about certain numerical values, there is complete agreement among geneticists concerning a number of basic facts. These can be summarized as follows:

(1) Radiations cause mutations.

(2) Practically all radiation-induced mutations which have effects large enough to be detected are harmful.

The change due to a mutated gene seldom is fully expressed in the first generation of offspring of the person who received the radiation. For mutant genes are usually recessive. If a child gets from one parent a mutant gene, but from the other parent a normal gene belonging to that pair, then the normal gene is very likely to be at least partially dominant, so that the normal characteristic will appear.

But this is not all of the story. For, like the red-hair gene, the harmful recessive mutant genes are not usually completely masked. Even when paired with a normal and dominant gene, they still have some detrimental effect.

Thus, most of the harm from a radiation-induced mutation might remain unnoticed, for a shorter or longer time, in the genetic constitution of the successive generations of offspring. But the harm would persist, and some of it would be expressed in each generation. On the average, a detrimental mutation, no matter how small its harmful effect, will in the long run tip the scales against some descendant who carries this mutation, causing his premature death or his failure to produce the normal number of offspring. In this way harmful mutations are eventually eliminated from the population.

Although many mutations disturb normal development of the embryo, it is not correct to say that all, or even most mutations result in monstrosites or freaks. In fact, the commonest ones are those with the smallest direct effect on any one generation—the slight detrimentals.

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(3) Any radiation dose, however small, can induce some mutations. There is no minimum amount of radiation dose which must be exceeded before any harmful mutations occur.

(4) Every generation of living things acquires some mutations from natural causes (background radiation and also heat and certain chemicals). These are called spontaneous mutations, and are also nearly all harmful.

We all carry a supply of spontaneous mutant genes. The size of the supply represents a balance between the tendency of old mutants to eliminate themselves, and the tendency of new ones to appear.

(5) Additional radiation over and above the irreducible background produces additional mutations over and above the spontaneous mutations. To the best of our present knowledge, if we increase the radiation that reaches the reproductive glands by X percent, the number of mutations caused by radiation will also be increased by X percent.

The total dose of radiation received by a person over his reproductive lifetime is what counts. The genetic damage done by radiation is cumulative.

(6) From the above five statements a very important conclusion results. It has sometimes been thought that there may be a rate (say, so much per week), at which a person can receive radiation with reasonable safety as regards certain types of direct damage to his own person. But the concept of a safe rate of radiation simply does not make sense if one is concerned with genetic damage to future generations. What counts, from the point of view of genetic damage, is not the rate; it is the total accumulated dose to the productive cells of the individual from the beginning of his life up to the time the child is conceived.

Individual versus population

It is easy enough to say that radiation causes genetic damage, but to define and measure the damage is very difficult.

In the first place, there is more than one way to look at the problem. One may think primarily in terms of individual damage, including distress to persons, or in more abstract terms of the population as a whole.

Geneticists who emphasize the individual point of view are concerned especially with the risk to the descendants of individuals subjected to a great deal more than the average amount of radiation. From the population standpoint, however, what is important is the effect of the average dosage on the characteristics of people in general.

If the whole population of the United States received a small dose of extra radiation—say one roentgen—there is good reason to think that, among the next hundred million children to be born, several thousand would be definitely handicapped because of mutant genes due to radiation. These several thousand would, so to speak, be lost in the crowd. No one could trace the direct connection between their special handicaps and the radiation dose, since there would be many more children handicapped from other causes (*e. g.*, spontaneous mutations).

On the other hand, if 10,000 individuals were exposed to a much larger dose of radiation (on the order of 200 roentgens) then there would be perhaps 100 handicapped children of these exposed individuals, in addition to the number resulting from other causes. In this case the connection with the radiation risk could be more readily established by a statistical study, and society might be more impressed by the hundred cases than it would ever be by the several thousand more hidden cases.

In addition to this contrast in numbers of cases there is also a contrast in quality of damage. The personal viewpoint inevitably places great emphasis on the (relatively rare) instances of subnormal mentality, gross physical defects, or disorders which lead to the progressive deterioration and long delayed death of an apparently normal child. These tragedies cause severe distress to the affected individuals and their families, and are clearly the most tangible and personal part of the genetic damage. From the population viewpoint, however, this part of the damage may be equalled or even outweighed by much more minor handicaps to very many more persons.

There is still a third aspect to consider. A population that is exposed, generation after generation, to an increased amount of radiation will experience a rising death rate and a falling birth rate because of harmful mutations, until a new equilibrium is established between the increased rates of mutation and elimination. If in this process the death rate comes to exceed the birth rate, the population will decline and eventually perish. At present we are extremely

uncertain about the level of this fatal threshold for a human population. This is one reason why we must be cautious about increasing the total amount of radiation to which the entire population is exposed.

How much damage?

Whatever one's point of view, the idea of genetic damage would be clearer if there were some way of expressing it in numbers. Many geneticists, including some on the study committee, feel that an attempt to do this cannot be very meaningful, given the present state of knowledge on human genetics. Others, however, think it possible to arrive at rough numerical values that have some significance.

Two approaches to the problem are represented in the report. First, an estimate is made of the amount of radiation, above the natural background, that would cause as many additional mutations in individuals who received it, as now occur spontaneously. This so-called doubling dose probably falls somewhere between 30 and 80 roentgens. Second, a figure is given for the total number of mutant genes that would enter the population in the next generation if everyone in the United States received a dose of 10 roentgens to the reproductive glands. The number is estimated to be about 5 million, with a large range of uncertainty.

Neither the spontaneous mutation rate nor the rate at which radiation induces mutation is known for man. The estimates are arrived at by reasoning from known values in lower forms like fruitflies. Some geneticists are dubious about this step.

Assuming the figures are somewhere in the neighborhood of the true values, what do they mean? At present something like 2 percent of all United States children are born with some noticeable genetic defect. If we were subjected generation after generation to an additional 30 to 80 roentgens, this figure would gradually rise to 4 percent.

Some geneticists feel that this is the most meaningful way of stating the effects. Others are more interested simply in the total number of mutations produced. They point out that, in the very long run, mutants eliminate themselves only through tragedy. Thus the 5 million figure represents to them the best measure of the burden which a 10-roentgen exposure would place on society.

In any case, we should not disregard a danger simply because we cannot measure it accurately, nor underestimate it simply because it has aspects which appeal in differing degrees to different persons. Two conclusions seem to be clear and important:

> We should vigorously pursue the researches which will in time give us a more precise way of judging all aspects of the risk.
>
> We ought to keep all our expenditures of radiation exposure as low as possible. From the point of view of genetics, they are all bad.

2. PATHOLOGY

Passing from the effects of radiation on future generations to its effects on persons directly exposed, we find a considerably simpler situation, so far as the general population is concerned. As has already been mentioned, the inheritance mechanism is far more sensitive to radiation than any other biological system. Therefore, if the general level of exposure is held down to genetically acceptable levels, there would be no noticeable effects on the bodies of the persons exposed. In fact, with two possible exceptions, doses several times as large as the limits recommended by the genetics committee are necessary to produce any obvious damage.

Shortening of life

The first exception has to do with shortening of life. There is considerable evidence, both from animal experiments and human mortality statistics, that exposure to moderate levels of radiation shortens life expectancy. (Radiologists die 5 years earlier on the average than physicians having no known contact with radiation.) This results not only from specific diseases, like cancer and leukemia, that can be caused by radiation, but also from more general, diffuse effects. Radiation appears to lower immunity, damage connective tissue and, in general, to lead to premature aging. Doses up to about 100 roentgens, when spread over years have not been shown to shorten human life. On the other hand, we cannot yet say that there is a minimum amount below which the effect does not take place. If very large numbers of people were exposed to a grad-

ually accumulated dose of 100 roentgens or even less, their life expectancy might well be lowered by a minor, but statistically observable amount.

Internal radiation

The second possible exception has to do with internal radiation. Until now we have been speaking almost entirely of radiation striking the body from outside. But if radioactive material is swallowed or inhaled, its potential harmfulness is multiplied many times.

At the moment there seems to be only one substance that might represent any threat to the general population in this way. This is strontium of atomic weight 90—one of the radioactive products of nuclear fission. A unique combination of qualities makes this substance especially dangerous.

(1) It is one of the more abundant fission products,

(2) its half-life is long enough (25 years) to keep it active for many years, yet short enough to make it a strong radiator,

(3) it is chemically very similar to calcium and so is taken up and concentrated by bone tissue which has an affinity for calcium,

(4) it is known to cause bone tumors in experimental animals,

(5) much of it does not fall back to the ground within a short time and short distance of an atomic explosion. Instead it is carried up into the stratosphere where it spreads over the whole earth and then is deposited gradually, over a period of years.

Already some children have accumulated a measurable amount of radioactive strontium in their bodies. The amount, however, is quite small—a thousandth of what is considered a permissible dose. Presumably, most of it came from the milk of cows which had grazed on contaminated pasturage. It appears, then, that strontium 90 is not a current threat, but if there were any substantial increase in the rate of contamination of the asmosphere, it could become one.

Radiation disease

Most of the attention of the pathology committee has been devoted to the medical effects of larger amounts of radiation, say 100 roentgens or more. Barring atomic warfare, there is no likelihood that the population in general would ever be subjected to such doses. People working in atomic energy installations, however, might be exposed to large doses through accidents.

We will not go into the detailed medical findings here. In general we may say that the type and severity of pathological effects depend on the amount of radiation received at one time and on the percentage of the total body exposed. It has been learned that shielding a part of the body, any part, reduces the damage in greater proportion than might be expected from the percent of the body mass protected. The reason for this is not yet known.

Very large single doses (say more than 800 roentgens) which strike all or most of the body inevitably cause death. Less than lethal doses produce a variety of effects. The most prominent immediate ones are blood and intestinal disorders; leukemia and cancer are among the chief delayed effects. The skin is very sensitive to radiation. People accidentally exposed to close-in fallout from weapons tests have developed marked external symptoms, including ulcers and loss of hair, although the total radiation they received was not enough to do serious internal damage. Unless the dose is heavy, skin effects are temporary.

The panel concludes that radiation injury is difficult to treat. Some success has been achieved with antibiotics (to prevent secondary infection) and blood transfusions. Certain substances have been discovered which, if taken immediately before receiving radiation, give some protection against its effects, but such treatment is not yet in any sense practical.

Much more research is needed on the pathological effects of radiation the panel believes. If, for example, it could be discovered why partial shielding gives disproportionate protection, or how the various protective substances work, this might point the way to more effective treatment or more practical protection.

3. RADIATION IN THE ENVIRONMENT

Up to this point we have been concerned with what happens when radiation gets to the ultimate consumers—human beings. Despite all the complexities involved, this is in one sense a comparatively straight-forward matter. It is assumed, so to speak, that X people receive Y roentgens of radiation and the problem is to predict what happens.

Now we must look into the very tangled problem of how the radiation gets to the people. It is a long way from Eniwetok to Chicago or Bombay. A power

station in Oslo or Moscow is a far remove from Johannesburg. Yet all these places are in the same ocean of air; all are surrounded by the interconnecting oceans of water. English grass has been sprinkled with strontium 90 from Nevada, and English cows have eaten it. Plankton in the North Sea has very likely taken up some of the radioactivity being dumped there from a British atomic reactor. Where did the ocean currents then carry this plankton? What fish fed on it? Who ate the fish?

Between the potential sources of man-made radiation and the people of the world is a vast, complex connecting network. It includes the air, the rivers and oceans, and the plant and animal life which form the links in the chain of our food supply. How radiation is distributed—or how its distribution can be controlled—is a problem that calls for the combined efforts of meteorologists, oceanographers, agricultural scientists and experts in the disposal of radioactive wastes.

The need for research

The specialists in these fields who make up the committees in the present study have thoroughly reviewed the current state of knowledge. On one thing, all seem agreed: We do not know enough. We must know more about how the winds or the ocean currents move, how plants and animals may concentrate radioactivity and transport it from one place to another. There is still time to find out, but not very much. The amount of man-made radiation that has been put into our surroundings so far is, from almost every point of view, probably negligible. But the testing of megaton weapons continues. In the next couple of decades the atomic power industry will mature and the question of what to do with almost unthinkable quantities of radioactive waste products will be upon us. We had better be ready with the answers.

4. METEOROLOGY

From the standpoint of meteorology, nuclear explosions are more important than controlled reactions in atomic piles, since the former put much more radioactivity into the air. The chief question which the meteorologists must answer is: Once the radioactivity has gone up into the air, when and where will it come down again?

Fallout

Fallout from explosions can be divided into three types: Close-in—material that returns to the earth within a few hundred miles of the site of the explosion and within 10 to 20 hours after it has occurred; intermediate—material that comes down in the first few weeks after an explosion; delayed—material that stays in the air for months or years before reaching the ground.

Close-in fallout is made up of heavier particles in the explosive debris, and is brought down chiefly by gravity. To figure out where it will land, it is necessary to know the type of explosion and to predict the wind patterns in the vicinity for the next 10 to 20 hours. Such predictions are, to put it mildly, not infallible; but, with the help of modern computing aids, they are getting better.

The prediction of close-in fallout is obviously extremely important in connection with the testing of nuclear explosives, but it does not directly concern the average person.

Intermediate fallout consists chiefly of particles so small that they would take a very long time to settle out by gravity. They remain in the lower atmosphere for several weeks and are carried many thousands of miles from the point where they originated. It has been discovered that, in the main, they do not simply settle out of the air but are washed out by rain or snow. This means that the material does not come down in a uniform, predictable pattern, but is concentrated in areas where there is precipitation. Hence, under some circumstances a rather limited region might get a disproportionately high share of the intermediate fallout from an explosion. Following a single Nevada explosion the cities of Albany and Troy in New York received one-tenth of a roentgen of fallout, or 1 percent of the 10 roentgens which the genetics panel has recommended as a maximum for the general population. It is unlikely, of course, that a single region would be so unlucky more than once.

Delayed fallout is made up of very fine particles that are blown into the stratosphere (higher than 40,000 feet). From the standpoint of its possible effect on humans, the important ingredient of delayed fallout is strontium 90. The stuff stays in the upper air so long that it is eventually carried over every part of the globe. How long it actually is stored in the stratosphere, and

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how it returns to the lower atmospheres and thence to the ground is still largely unknown. In fact, the general problem of mixing between upper and lower air layers and of diffusion of material throughout the atmosphere are major questions of meteorology today. This is another of the numerous instances where the answer to radiation questions awaits the solution of more basic scientific problems. It is also true that tracing the course of the radioactive material may be of considerable help in finding the basic solution.

Atmospheric motions are not the only unknown factors in determining fallout. A good deal is yet to be learned about the anatomy of the explosions—the heights to which various radioactive species are carried, the varying effects of exploding on the ground or at different heights above it, and so on. Also, there is need for improvement in the methods of measuring worldwide fallout.

Airborne radioactivity from industry

At present weapons tests are the chief source of artificial airborne radioactivity. In time, however, the power industry will far outstrip military development work in producing radioactive fission wastes. If not adequately controlled the power program can become a dangerous source of atmospheric radiation.

Some fission products are gases. If these were released into the air indiscriminately by a worldwide power industry, they would raise radiation levels in the lower atmosphere above what is considered biologically permissible. Obviously, they will have to be contained, or released in limited quantities and at carefully selected times and places.

Major accidents to large power reactors, while very unlikely, are not impossible. If a reactor core vaporized completely, it would spread radioactivity over thousands of square miles unless the vapor were confined. This is why reactors built near populated areas should be housed in sealed buildings strong enough to withstand the pressure developed in the worst nuclear accident.

Tracer studies

One of the tolls which will be used in carrying out the necessary research is radiation itself. Because radioactive substances can be detected in incredibly minute quantities, they make excellent tracers. Medical and biological research have been virtually revolutionized in the last decade by tracer methods. Just as the course of a vital process can be followed with a radioactive isotope and a Geiger counter, so can the courses of winds and tides. Weapons tests themselves have yielded a good deal of information about the motions of the atmosphere, as their radioactive clouds were traced over the earth. More may be learned by releasing specific radioactive materials in the air purely for purposes of meteorological research.

The atomic bomb and the weather

Ever since the first atomic explosion people have wondered about the possible effect of these superpowerful blasts on the weather and climate. The meteorology committee has considered the matter in the light of all the information collected over the past decade. Its conclusion: "No evidence has been found which indicates that the climate has been in any way altered by past atomic and thermonuclear explosions. The amount of study given to the problem is sufficient to indicate that it is unlikely that any test explosions conducted in the number and along lines similar to past tests will have any important effect on the weather. However, this conclusion is based on our present knowledge and the importance of the subject requires continued study."

5. OCEANOGRAPHY AND FISHERIES

The problems considered by this committee are, of course, very much like the ones in meteorology. A load of radioactive material is put into the ocean at a certain point. Where does it go from there and how long does its journey take?

There is a general tendency, in estimating the effect of dumping foreign matter in the ocean, to assume that it will mix promptly and completely throughout all the waters of the earth. So many tons of waste divided by so many billions of gallons gives some negligible fraction of an ounce per gallon. Nothing could be more misleading, the oceanographers warn.

How thoroughly do ocean waters mix?

The current systems of the oceans are varied and complex. They are still very imperfectly charted. But it is known that there are great differences in mixing rates for different regions of the seas. The water in the deeps of the

Atlantic has been there for at least 150 years. No one knows yet how it exchanges with surface waters—whether intermittently, at a slow continuous rate, or otherwise. Radioactive wastes deposited on the ocean bottom would have a long time to decay and probably would be diluted with a large volume of deep water before they got into the surface circulation in any amount. This would remove the hazard in the case of short-lived fission products. Oceanographers do not know enough to be able to tell whether long-lived radioactive isotopes, such as strontium, could be safely disposed of in this way.

On the other hand, materials dumped in coastal waters, or upper layers anywhere, will in the course of a few decades at most be carried to all parts of the ocean. There is no place in the sea, the committee cautions, where large amounts of radioactive materials can be introduced into the surface waters without the probability of their eventually appearing in another region where human activities might be endangered.

Plants and animals concentrate and transport radiation

The dispersal problem is complicated by the fact that the living inhabitants of the ocean as well as the currents may spread materials from one place to another. Furthermore, plants and animals can concentrate certain substances many thousands of times. Water-dwelling creatures process untold millions of gallons of sea water, extracting from it the materials they need for their body chemistry. Shellfish concentrate calcium and strontium in their shells. Fish concentrate zinc. If these substances are present in their radioactive forms, the radioactivity will be concentrated at the same time, thus reversing the tendency to more and more dilution.

The committee has considered the question: "Has the atomic energy program as yet resulted in serious damage to marine life?" Its answer is "Probably no * * * There is no evidence that any lasting damage has been done to the animal or plant population of the sea or large inland water bodies by the release of radioactive substances" from weapons tests or reactors.

Research is needed

The need at present is for intensified research to determine how the waters of the seas actually move, what role marine life will play in the mixing process, what regions are sufficiently isolated so that they can safely take up large quantities of radioactivity.

As the atomic power program grows, limited, experimental, controlled sea disposal of radioactive wastes will help determine the safe limits of this method. The committee points out, however, that the operation must be very carefully regulated and evaluated. It recommends that a "national agency with adequate authority, financial support and technical staff regulate and maintain records of such dosposal" and that the effects on the sea be thoroughly studied.

The United States and other countries with large uninhabited land areas will probably be able to store radioactive wastes until it becomes clear how they can be safely disposed of. However, countries with small land areas and large populations may have to start dumping wastes into the sea from the beginning of their atomic energy programs. The committee reminds us that what happens at any one point in the sea ultimately affects the waters everywhere. Hence it recommends that, as soon as possible, international agencies set up conventions for the disposal of atomic wastes at sea and that research into the problem be carried out on a cooperative, international basis.

The oceanographers plead with "all urgency" that the program of research be stepped up immediately. The problems cannot be attacked quickly or even in many cases directly. Decades of effort will be necessary and mankind will be fortunate if the required knowledge is available at the time when the practical engineering problems have to be faced. They also point out that radioactive materials are powerful tools for studying the biology of fishes and other sea creatures, and thus ultimately for increasing the harvest of the sea.

One of the findings of the committee dramatizes the urgency of oceanographic studies. Radioactive tracers will play an important role in the study of ocean currents and mixing. For the successful use of tracers, the general level of radioactivity must be low enough so that the extra radiation represented by the tracer material can be detected. Such studies can be made today, but this situation will not last very long. "Because of the increasing radioactive contamination of the sea, and the atmosphere," the committee points out, "many of the necessary experiments will only be possible within the next 10 or 20 years. The recommended international scientific effort should be developed on an urgent basis."

6. AGRICULTURE AND FOOD SUPPLIES

This committee has given a good deal of attention to controlled and constructive uses of radiation in agriculture as well as to the harmful effects that would result from general contamination.

It finds that radiation techniques are of great potential value in research. However, it does not believe that they are leading to any drastic, imminent improvement in agricultural production.

Tracer studies

By incorporating radioactive atoms in the molecules of various substances, it is possible to trace the fate of these substances through complex biochemical reactions. Such studies have already been enormously fruitful in helping us understand essential metabolic processes in plants and animals. They may be expected to be increasingly fruitful as the number and diversity of experiments increase. Tracer methods are useful in many of the problems of agricultural technology as well as in more basic investigations. Thus, radioactive isotopes have been used to study the placement and recovery of phosphorous fertilizers in soils; the efficiency of various methods of applying of insecticides, fungicides, and herbicides; the utilization of feed components by animals, etc. Use of tracers in applied research may be expected to expand, and the immediate dividends may be considerable. Further, it is likely that new methods of employing isotopes will be developed; the igenuity of investigators in this field should not be underestimated.

Mutations

Many researchers are now using radiation to increase the mutation rates in various plants, for the purpose of developing new and improved varieties. Even when they are subjected to radiation, most species have a low mutation rate, and furthermore most mutations are disadvantageous. Hence the investigator must deal with very large numbers. Also, he has been able so far to look only for obvious changes that show up in form or appearance, or for changes which can be recognized by some blanket method such as inoculating all irradiated plants with disease organisms in the hope of finding some that resist infection. It is likely that characteristics at present unrecognized also undergo change. These represent unexplored potentialities for producing better crops.

Radiation has hardly simplified the problems of crop improvement research; on the contrary, it has made them more complex. But it opens many new possibilities. It is not likely that acceptable new varieties can be obtained simply by irradiating existing plants, although this is possible if large enough populations are examined. In general, however, backcrossing and recombination are needed to add the new characteristic to a crop plant acceptable in other respects.

Relatively few new varieties of economic plants developed with radiation, have actually been introduced and widely planted. Those that have, however, attest to the potentialities of the method.

Radiation and animal production

Whereas radiation-induced mutations may be of considerable help in developing better crops, they are not so likely to be useful in improving animal breeds. It is not that farm animals are less responsive to radiation than plants, but their size, their cost, and the time required to breed each generation make the necessary experiments less practicable. Probably only poultry and perhaps swine could be handled in sufficiently large numbers. And even here, judging from work with smaller laboratory animals, the chances of improvement seem slim.

Tracer studies on animals are helping to clear up many problems, both in physiology and in applied fields such as the utilization of feed constituents. This type of research is seriously hampered by the expense of disposing of experimental animals. Even where only short half-life isotopes are involved, and at tracer levels, the animals cannot be marketed through the usual outlets, but must be destroyed. The committee believes that essential research is being discouraged. It recommends that procedures and standards be developed which would adequately protect the consumer, but permit the marketing of animals used in radiation experiments.

Contamination

The natural content of radioactive elements in foods now consumed by animals and man is not the same as in the preatomic age. Though extremely small, the difference is measurable, and inescapable. Fallout from weapons tests has added

radioisotopes which were not there before to air, soil, and water. The radioactive elements are taken up by crops through the roots and also directly through the leaves. The committee believes that the slowly rising background of radiation caused by weapons testing in peacetime at the present rate is not likely to impair or interfere with food production. However, the levels which might result from atomic warfare, or from mishaps with nuclear powerplants in peacetime could have catastrophic effects on agricultural production. In case of severe contamination the material causing most concern would be strontium 90. There appears to be no way of preventing its accumulation in bone tissue. All available foods in heavily contaminated areas might contain significant levels of radiostrontium, perhaps for years.

At present it is not known at what level food becomes unwholesome because of radioactivity. There is not nearly enough information on the long-term biological effects that may follow when men or animals eat radiation-contaminated food. The committee therefore urgently recommends a long-range research program to investigate these effects. The experiments must be carefully planned to give the kind of realistic information which is needed by agencies charged with protecting the public.

In order to learn about the effects of high levels of radiation on the environment, the committee suggests that ecological studies might be undertaken in areas near weapons test sites. The distribution of radioactivity in the soil at various depths, in the vegetation, in the wildlife, in the streams, and so on, could be investigated. It is possible that land use may influence the accumulated radioactivity in the soil. Forested land, range land, rotation grassland, and plowland, irrigated and nonirrigated, may each present a different situation.

Radiation in food processing

Radiation can be used to sterilize certain foods. This process could have a dramatic impact on food technology by reducing the need for refrigeration and prolonging the shelf life of many products. Experiments to date indicate that irradiated foods do not become radioactive and that they will be suitable and safe for consumption by man. As an industrial process, radiation treatment is especially attractive because it can (and should) be carried out after packaging.

Some radiation-sterilized foods have been found to develop off flavors, and changes in order or texture. The committee believes, however, that with further research means may be found to prevent these undesirable changes.

7. WASTE DISPOSAL

The atomic energy program will soon present an unparalleled problem in storage. To keep our general surroundings habitable, enormous quantities of waste products from nuclear fission will have to be tightly contained for very long times.

Past experience gives only a pale intimation of what is to come. To date, comparatively small quantities of wastes have been collected from the various Atomic Energy Commission establishments, which are mostly in isolated regions. Essentially none of the highly radioactive material has been released to the environment, but is stored for the time being in tanks.

How much waste?

The committee estimates that by 1965 United States reactors will be producing somewhat more than 20 pounds of fission products per day (equivalent in radioactivity to tens of tons of radium). Almost all of this will come from powerplants in electric utility networks or naval vessels. By 1980, the accumulated solutions of wastes may amount to 200 million gallons; by 1990, to 600 million; by 2,000 to 2.4 billion.

Another dimension of the problem is pointed up by questions of legislation and insurance. What kind of laws, and what type of insurance policies should apply to a company which owns fission products, considering that the materials will retain their radioactivity for, possibly, centuries after the owner has ceased to exist?

Technical problems

Day-to-day operation of reactors releases some radioactive waste, but methods are already at hand for disposing of it safely. The big problem arises when fuel elements are removed from the reactors and reprocessed. This is when the fission products are taken out. Some of them, such as cobalt 60, are themselves

useful, and methods must be developed to separate them economically. Finally the question remains, what to do with the rest?

One unpleasant property of the fission products is that they are literally as well as figuratively hot. The more concentrated they are, the hotter their radioactivity makes them. To make storage easier, the wastes should be highly concentrated. But beyond a certain limit they heat up so much that it becomes necessary to cool their containers artificially.

Research thus far has indicated that a number of systems for ultimate disposal of wastes may be feasible, the committee states. Considerably more work is required, however, before any of them is at the point of economic operating reality.

Other aspects also require more investigation. Where should reactors and, especially, fuel processing plants be located? What is the best and safest way to transport large quantities of highly radioactive material? What geophysical and geochemical conditions determine the actual capacity of various regions of the earth to receive radioactive materials?

Accidents

As in every other area of human activity, accidents are bound to happen in the atomic-energy program. The problem here is to set up large enough margin of safety so that the accidents that do occur are not catastrophes.

The most serious possibility is that the core of a large reactor might overheat so severely as to vaporize its material completely. If the vapor were released to the air, it would spread disastrous quantities of radioactivity over thousands of square miles. Such an accident is highly unlikely in a properly designed reactor.

Nevertheless, the barest chance of its happening in a highly populated area is intolerable. Until advances in reactor technology substantially reduce potential hazards, reactors located in these regions should be enclosed in sealed buildings, strong enough to withstand the pressures developed by the expanding vapor.

Also, the effects of accidental power surges on a reactor should be more thoroughly investigated, and better means of controlling them developed.

Accidents in handling and transporting radioactive materials may be quite serious where they happen, but they should not affect a wide area. The contaminated section can always be cleaned up.

It appears that nuclear reactors can be used with reasonable safety to power ships.

Plans for using reactors in locomotives and commercial aircraft are not yet advanced enough so that the consequences of accidents can be foreseen.

CONCLUSION

It is clear that the safe and rational growth of a nuclear-power industry involves more than designing individual plants. The presence of a single large installation will be felt, in various ways, over a wide region. Obviously, it will not do to let nuclear plants spring up ad lib, over the earth. The development of atomic energy is a matter for careful, integrated planning. A large part of the information that is needed to make intelligent plans is not yet at hand. There is not much time left to acquire it.

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